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INVENTORY OF SAN JOAQUIN KIT FOX ON BLM LANDS  
IN SOUTHERN AND SOUTHWESTERN SAN JOAQUIN VALLEY  
FINAL REPORT

AUGUST 1980

PREPARED FOR BUREAU OF LAND MANAGEMENT,  
U.S. DEPARTMENT OF THE INTERIOR  
THROUGH INTERAGENCY AGREEMENT CA-910-IA9-4 WITH THE  
DEPARTMENT OF ENERGY, NEVADA OPERATIONS OFFICE

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INVENTORY OF SAN JOAQUIN KIT FOX ON BLM LANDS  
IN SOUTHERN AND SOUTHWESTERN SAN JOAQUIN VALLEY  
FINAL REPORT

by

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AUGUST 1980

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## SUMMARY

The objectives of this study were to provide the Bureau of Land Management, Bakersfield District, with information on the distribution of the San Joaquin kit fox, an endangered species, on public lands in the southern and southwestern San Joaquin Valley of California, and to develop information essential for designating kit fox critical habitats on lands under their jurisdiction as outlined by the Endangered Species Act and its amendments.

A total of 31,860 acres of BLM lands were surveyed using line transects at a density of 8 per linear mile. Observations were recorded on: 1) kit fox dens, tracks, scats, and remains of their prey; 2) vegetation associations; 3) topography; 4) evidence of human activities; 5) species composition and abundance of wildlife seen, especially lagomorphs; 6) presence of *Eriogonum gossypinum*, a plant of special interest; and 7) presence of the blunt-nosed leopard lizard, another endangered species. A night spotlight survey was also conducted in the Chico Martinez Land Unit to assess the presence of kit fox in the area.

Surveyed parcels were arranged in 10 land units. These units, and a rating system designed specifically for this project, were used to facilitate synthesis of data and subsequent critical habitat recommendations.

Based on field data gathered in 1979 and on scores in the rating system, the following priorities were assigned to land units: highest priority for Buena Vista Valley, Chico Martinez, and Bitterwater Creek; secondary priority for Midway Valley, Kettleman Hills, and Telephone Hills; and low priority for Temblor Foot-hills. The Frazer Valley, Cuyama Valley, and Fellows land units should not be considered in establishing critical habitat status.

A total of 282 dens were observed, 58 of which were positively identified as kit fox dens. The estimated relative density (number/1000 acres) of kit fox dens for all land units combined was 1.8 dens/1000 acres: the highest density of non-natal dens was 4.0/1000 acres on the Midway Valley Land Unit; the greatest density of natal dens was 1.6/1000 acres on the Bitterwater Creek Land Unit.

Relative densities of lagomorphs — black-tailed jackrabbits and Audubon's cottontails — were greatest on the Telephone Hills, Midway Valley, Fellows, and Buena Vista Valley land units, and ranged between 35 to 45/1000 acres.

Only the Chico Martinez Land Unit appeared to have sufficient space, 4344 contiguous acres, to support an adequate breeding density of kit fox. The remaining land units consisted of small parcels of land, less than 640 acres, scattered throughout the valley.

Heavy grazing by sheep and cattle may have negatively impacted vegetation and soils in potential kit fox critical habitats in the Chico Martinez and Kettleman Hills land units. Intense petroleum activities in the Fellows Land Unit have destroyed the area and precluded most other uses.



Steep, rugged relief of the Cuyama Valley and Temblor Foothill land units makes them unsuitable as kit fox critical habitats.

Kit fox natal dens had 40% more entrances than non-natal, multiple-hole dens. Dens were found at elevations between 162 and 708 m, even though areas up to 1135 m were surveyed. About 81% of the kit fox dens were found at or below mid-slope, and 90% were located where the slope angle was less than 40°. Most, 66%, of the dens faced the eastern half of the compass. No evidence was gathered showing that kit fox dens sites were selected because of the presence of particular plant species or associations.

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Our BLM Contract Administrator, Dr. Jerry Boggs, contributed a great deal to the success of the project. His enthusiastic interest in our work, understanding of our problems, and flexibility in approach and administration were appreciated by all of us. We also wish to thank Bruce Bowen of the BLM, Bakersfield District, for his assistance, especially in providing maps, useful information, logistic help, and cooperative contacts.

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# 1. INTRODUCTION

## 1.1 BACKGROUND

On 28 December 1973, the Endangered Species Act (ESA) (Public Law 93-205) became law and superseded similar acts passed in 1966 and 1969. In Section 2(c) and Section 7(a) it was declared that all Federal departments and agencies shall seek to conserve endangered species and threatened species listed pursuant to Section 4 of the ESA. Section 7(a) further states that each Federal agency shall insure that any action authorized funded or carried out by such agency does not jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary of Interior to be critical.

According to Section 2(5)(A) of the ESA,

"the term 'critical habitat' for a threatened or endangered species means: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of this Act, on which are found those physical or biological features, (i) essential to the conservation of the species, and (ii) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species."

It should be emphasized that application of the term 'critical habitat' need not be restricted to the habitat necessary for a minimum viable population (Federal Register Vol. 40, No. 78, 22 April 1975).

In determining 'critical habitat' for a given species, the U.S. Fish and Wildlife Service (FWS) considers the following as vital needs:

1. Space for normal growth, movements, or territorial behavior
2. Nutritional requirements, such as food, water, minerals
3. Sites for breeding, reproduction, or rearing of offspring
4. Cover or shelter
5. Other biological, physical, or behavioral requirements (Federal Register Vol. 40, No. 78, 22 April 1975)

The San Joaquin kit fox, *Vulpes macrotis mutica*, was once a widely distributed predator in the semi-arid Central Valley of California. Now considered to be endangered, it has been on the Secretary of Interior's List of Endangered and Threatened Species since 1966 (Federal Register, 41:43339-43358 and 41:47170-43358).

The subspecies is also considered to be rare by the California Department of Fish and Game, and it is now in the IUCN Red Book (1968) of rare and endangered species of the world.

Because kit fox are relatively unwary animals (Hall, 1946; Egoscue, 1956, 1962, 1975; Laughrin, 1970; Morrell, 1972), they appear to be sensitive to human activities. Highway fatalities are a significant source of mortality (Egoscue, 1962; Morrell, 1972). Kit fox are also vulnerable to night hunting for predators (Laughrin, 1970; Morrell, 1972). Poisoned grains used to control rodent populations in California pose a serious threat because kit fox may become secondary, non-target, victims if they consume poisoned rodents or bait (Swick, 1973; Schitosky, 1975). Indiscriminate disturbance of kit fox habitats and prey by off-road vehicle enthusiasts may also have a serious, negative impact on the species (Laughrin, 1970).

However, the most serious threat to survival of the kit fox appears to be significant loss of suitable habitat due to increased agricultural development (Laughrin, 1970; Morrell, 1972; 1975). Increased petroleum development in the San Joaquin Valley has also resulted in native habitat alteration due to construction of drilling pads, roads, and pipeline corridors. Since the Bureau of Land Management (BLM) is involved in granting permits for oil and gas developments, it has the responsibility to ensure that the kit fox and its critical habitat are not negatively impacted by energy developments.

Information on present kit fox distribution and critical habitat on public lands is required before potential impacts of oil and gas development can be adequately assessed. On 23 May 1977, President Carter directed the Secretary of Interior to accelerate identification of critical habitats of endangered species. Support for implementation of this directive as it applies to the San Joaquin kit fox was made available through funds allocated to the BLM.

## 1.2 OBJECTIVES

The primary objectives of this study were to provide the Bakersfield District of the BLM with information on San Joaquin kit fox distribution on public lands in the southern and southwestern San Joaquin Valley of California, and to develop essential information for designating kit fox critical habitats on lands under their jurisdiction, as outlined by the Endangered Species Act and its amendments.

## 2. METHODS

### 2.1 TRANSECTS AND OBSERVATIONS

As prescribed by the BLM, the standard for kit fox inventory was eight 1-mile transects, at 200-yard intervals, for one complete 1-square-mile section. The number and length of transects for other-sized parcels of land were adjusted proportionately.

Trained observers slowly walked (<1 mph) the transects using hand-held compasses to maintain a straight line. All data were recorded in field notebooks, and later transcribed into permanent ledger books. Data included: date, time, temperature, and weather during transects; presence of kit fox signs (i.e., den sites, scats, tracks, and prey remains); topography and vegetation associations along the transect; evidence of human activity (impact); and tallies (species and number) of all wildlife observed. Special efforts were made to observe and tally lagomorphs, specifically black-tailed jackrabbits, *Lepus californicus*, and cottontails, *Sylvilagus audubonii*, because they are important prey for kit fox. Special care was also taken to locate populations of the cottony buckwheat, *Eriogonum gossypinum*, which is considered to be rare in California. Observations of the endangered blunt-nosed leopard lizard, *Crotaphytus silus*, were also recorded, although our surveys were not conducted during the time of year when this species is most active above ground.

Each den site encountered during the transect was examined for the following characteristics: 1) activity (active versus inactive); 2) type (natal, multiple-hole, single-hole); 3) number of entrances; 4) position on slopes; 5) direction faced; 6) slope angle of the den site measured in degrees with a hand-held clinometer; 7) elevation; 8) vegetation dominants; 9) presence or absence of fox tracks, scats, prey remains, matted vegetation, dirt berms, signs of other mammals and owls, human activities and/or disturbances; and 10) distance of den from the transect line. Dens were positively identified as kit fox dens only when the investigator was satisfied that the size and shape of the den and associated signs (tracks, scats, prey remains) were consistent with those of a kit fox den. All other dens were recorded as "unidentified" or as coyote or badger dens.

After consultation with the Contract Administrator (Dr. Jerry Boggs), the Principal Investigator (Dr. Thomas O'Farrell) and the field crew agreed to use the perpendicular distance from the den to the centerline of the transects in order to estimate the effective width of the transect. This perpendicular measurement was needed to estimate the proportion of each parcel of land that was actually observed from the transect line.

All located den sites were plotted in the field on 7.5-minute topographical maps, and were placed later on permanent topographical maps included with the master copy of the final report to the BLM. Den sites plotted on the topographical maps were given code numbers, so that the corresponding data for each den site could be located in the ledger books.

## 2.2 NIGHT SURVEY

At the BLM's request a night spotlight survey for kit fox was conducted on a 6-square-mile parcel of BLM land on the Chico Martinez Oil Field, Carneros Rock Quadrangle, Kern County, California. Two people in the back of a pickup truck, driven at 5 mph with high beams on, used spotlight to note animals in areas perpendicular to the truck's path. When eye shines were detected, the vehicle stopped; the identity of animals was determined; and the driver recorded time, mileage, and species.

The survey was preceded by both a test night survey in known kit fox habitat along the Buena Vista Valley, and a daylight trip through the survey loop. The daylight trip was taken to familiarize the crew with the terrain and route and to test the efficiency of the survey techniques.

## 2.3 LAND UNITS

The surveyed BLM land parcels were combined into 10 "land units," which form the basis for recommendations concerning kit fox critical habitat in this report. The purpose of these combinations was to group adjacent ecologically similar BLM parcels into convenient land-use and habitat zones. Combinations (of parcels) were made on the basis of 1) proximity of parcels, 2) topography, 3) vegetational similarity, and 4) existing land use patterns, primarily in terms of habitat disturbance. These land units form distinct ecological units, and should provide a useful basis for management procedures.

## 2.4 DATA SUMMARIES

After completing all transects on a given parcel, summary sheets were prepared to provide the BLM with a brief analysis of that parcel on a section-by-section basis. Included in these section summary sheets is information on 1) topography; 2) habitat, vegetation types, and impacts; 3) prey base, number of jackrabbits and cottontails; 4) evidence of kit fox, dens, scats, tracks, and prey remains; and 5) recommendations as regards critical habitat. Section summary sheets of all land parcels surveyed are found in Appendix A.

All information gathered at each den site was transcribed onto the den analysis sheets found in Appendix B. These are arranged by land unit so that all data for each den site in a specific land unit is readily available. The total numbers of mammals, reptiles, and birds observed on all land units are given in Appendix C.

## 2.5 VEGETATION DESCRIPTIONS

Although no quantitative vegetation survey was undertaken, the field crew observed and recorded plant species present along transects, and noted changes in annual and perennial plant associations. They were also required to make detailed notes on the characteristics of vegetation immediately surrounding each kit fox den. These characteristics included qualitative information on 1) species composition and relative density of dominant shrub cover, 2) species composition and relative density of understory grasses and forbs, 3) presence of unusual or uncommon species, 4) general condition of vegetation, and 5) observations of vegetation disturbances due either to the kit fox or human activities.

## 2.6 CRITICAL HABITAT RATING SYSTEM

A numerical rating system was devised as a quantitative basis for making recommendations on the potential of the surveyed lands as kit fox critical habitat. Ideally, such a rating system should allow quantification of the various biological and physical factors thought to be most important in establishing an area's potential as good habitat for a breeding population of San Joaquin kit fox.

The U.S. FWS provided a set of basic guidelines for the delineation of

"vital needs ... relevant in determining: 'critical habitat' for a given species: (1) space for normal growth, movements, or territorial behavior; (2) nutritional requirements, such as food, water, minerals; (3) sites for breeding, reproduction, or rearing of offspring; (4) cover or shelter; or (5) other biological, physical, or behavioral requirements."

These guidelines were modified, both in the selection of pertinent field data to be collected and in the development of the rating system, so that they would apply more specifically to what is known of the ecological requirements of the kit fox.

Certain ecological variables are much easier to observe and to measure than others, which is a common difficulty when attempting to devise an objective system for summarizing and quantifying something as complex as critical habitat. Therefore, the rating system that was developed and applied to each land unit combines some quantifiable categories with other, subjective, unmeasurable factors, in an attempt to provide as complete a basis for comparison as possible.

The "why" of the rating system, that is, the reasons and assumptions, the objective and subjective bases for decisions, are discussed in detail in Subsection 4.4 of the Discussion section. This section emphasizes more the "what" of the rating system, the categories decided upon and the values assigned to them.

Since knowledge of the specific ecological requirements of kit fox populations is still incomplete, various assumptions were made in selecting the categories for the habitat rating system. Each of the categories, "Presence of Species," "Breeding Sites," "Prey Base," "Space," and "Other Habitat Parameters," was assigned a set of numerical values to reflect conditions observed between the most and least "optimal" state. Most optimal was given a value of 3, the least optimal a value of 0 (zero), and intermediate values were assigned depending on the measurability of the factor over the range of conditions. Each land unit was then assigned a value for the overall quality of each category as determined by field data and observations.

Lacking more concrete knowledge of the optimal conditions for excellent kit fox habitat, values were assigned on a comparative basis, using experience with areas of known high density kit fox populations, e.g., Elk Hills, NPR-1, and several of the surveyed sections of BLM land as standards for conditions known to support a good breeding population. The suboptimal states were even more difficult to determine and, again, could be evaluated only on a comparative basis using data from this and a similar study on Elk Hills.



Presence of the species was considered essential in determining the potential value of a land unit as kit fox habitat, and was equated with the other four factors. The most definitive evidence of kit fox observable during daytime transect-type field surveys is the presence of dens. As outlined in the methods section, dens observed were classified into six categories depending on number of holes, signs of recent use, and whether the den site was used as a maternal den for rearing pups. For comparative purposes a relative index of den density was calculated on the basis of the number per 1000 acres for each land unit. The relative density indices for each type of den, and the total of all types, for each land unit was then plotted and ranked on a scale with the other land unit. Those land units considered to be outstanding with respect to the others, in terms of the relative density of dens, were assigned a value of 3; those units with no dens were assigned 0. Land units with intermediate densities of dens were assigned a value of 1 in order to weight the maximum value more and provide a more useful point spread. In the course of the transect work, presence of kit fox scats, prey remains, and tracks were also noted, but these data were not quantitative enough to be useful in a rating system.

The second category, relative density of breeding sites, specifically natal den sites, was chosen because it is probably the most important indicator of the presence of a breeding population. Again, the different land units were plotted together on a scale, and those with relatively high densities of natal den sites were assigned a value of 3, those with no den sites a value of zero, and those with intermediate numbers a value of 1.

Presence of an adequate prey base was the third important factor used to rank the potential of land units as critical habitat. On the assumption that San Joaquin kit fox prey heavily on lagomorphs, especially during the breeding season, the relative densities of jackrabbits and cottontails were tallied for each land unit. These were then ranked together on a scale; those with relatively heavy densities of lagomorphs were assigned a value of 3, those with relatively very low densities a value of zero, and those with intermediate densities a value of 1.

When evaluating the potential value of an area as critical habitat for kit fox, a very important factor is the available space to support and protect a breeding population. Ideally, designated critical habitats should consist of large contiguous areas under federal jurisdiction that have minimal unprotected peripheral areas. This factor should be considered in light of what is known of kit fox home range requirements. Morrell's (1972) estimate of 1 to 2 square miles was used for assigning optimal and suboptimal values to the various land units. The largest contiguous parcel of BLM land, Chico Martinez, encompassed only 6 square miles, and was considered suboptimal for supporting an adequate breeding population. Therefore, no maximal values of 3 or 2 were assigned; instead, 1 was used as the highest value, and 0 was assigned as the lowest value for land units with relatively small, widely scattered acreages.

The fifth category, other habitat parameters, was created for consideration of other factors thought to influence kit fox populations, but which are not strictly quantifiable with the available data. The impacts of grazing and oil development and the influence of topography were rated separately for each land unit, three numerical values were added, and the totals of each land unit were ranked together on a scale. Those land units with the highest and lowest values were assigned values of 3 and 0, respectively, while land units with intermediate values received a rating of 1. The combined subjective judgement of the field



crew was required to evaluate the impact and importance of disturbance and topography on the various parcels and land units.

Grazing by sheep and cattle was seen in many areas throughout the survey and was assumed to have a possibly deleterious effect on the herbivorous prey species of kit fox, although no studies have been published to test this hypothesis. A maximum positive score of 3 was assigned to a land unit that had no observable grazing and no stock present. Since some degree of grazing was seen in at least parts of all the land units, no score of 3 was assigned, and the land units with the least grazing were given a score of 2. The Kettleman Hills Land Unit, which showed extensive overgrazing, was assigned the lowest value of 0, and land units with moderate grazing were given a value of 1. We decided that grazing impact was not applicable to the Fellows Land Unit, as the entire area consisted of oil leases with sparse vegetation; in effect, this area received a rating value of 0. Again, these values were subjective and were based on relative judgements of the field staff.

Undoubtedly the most striking human impacts observable in this study of BLM lands in this part of the San Joaquin Valley were those due to oil and gas development. Specific effects of oil development on populations of the kit fox are unknown. One land unit, Fellows, has been so drastically altered by intensive oil development that for all practical purposes it has been destroyed as a natural habitat. This land unit was assigned a minimal rating of 0, a land unit with no oil development was assigned a maximum value of 3, and other land units were subjectively ranked into moderate and light oil development categories, with scores of 1 and 2, respectively. Light oil development was regarded as very minimal development in only a small portion of the land unit.

Topography was included in the "other habitat parameters" category because several land units had extremely steep, high-relief topography. Our field experience and results of various life history studies (Morrell, 1972) indicated that the kit fox makes little use of such rugged terrain. Therefore, areas which might otherwise have been regarded as good potential fox habitat, using the other indicators, were in fact unsuitable owing to lack of the gentler terrain required by kit fox. Land units consisting mostly of very steep topography (some sections being so steep and inaccessible as to be deleted from field surveys) were assigned a score of 0, and all other sections were considered topographically suitable for kit fox and were assigned a value of 2.

The degree to which the above three factors affect distribution and abundance of breeding kit fox populations is unknown. Very possibly these factors could and should be considered separately and equally with the first four categories. However, the scores for each land unit on these last three factors were added to form a cumulative score under the category 'other habitat parameters', and each land unit was then ranked accordingly.

After a rating was assigned in all five categories for each of the ten land units, a cumulative score for each land unit was summed. These total scores were then used as a comparative index for evaluating the land units with relation to each other as potential kit fox critical habitats.

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### 3. RESULTS

Field surveys to determine the potential of BLM lands in the southern and southwestern San Joaquin Valley as critical habitat for the San Joaquin kit fox were conducted between 10 September and 16 November 1979. A total of 35,820 acres of public land was assigned for inventory (Table 1), but 3960 acres were examined and subsequently deleted from intensive field surveys (see Table 2) because they were either inaccessible or unduly rugged. Our previous experience on Elk Hills showed that kit fox were absent from extremely steep slopes. In 11 other sections (Table 3) the standardized number of transects was not walked, and a modified transect technique was employed.

After all parcels were surveyed and field data recorded, they were arranged into geographical "land units" so that ecologically similar parcels could be described and analyzed as manageable land use and habitat zones. These divisions were designed to facilitate analysis and comparison between land units, and to provide a basis for recommending to the BLM critical habitat areas for the San Joaquin kit fox. Field crew members experienced with all of the surveyed parcels created ten land units (Fig. 1), which will be described here and evaluated later.

After the field data were tabulated by land unit, the units were then compared and scored according to the rating system for each of the habitat categories outlined in the Methods section. The ten land unit summaries in this section are a complete synthesis of all characteristics and include 1) a description of size, integrity, and general topography; 2) elevational ranges; 3) an overall characterization of vegetation associations; 4) soil types if observed; 5) land use; 6) ratings for all categories in the kit fox critical habitat rating system; and 7) a final evaluation of the potential of the land unit as critical habitat for the kit fox. The summaries are followed by more detailed presentations of the data gathered for each category of the critical habitat rating system.

Table 1. BLM lands of Bakersfield District, California, assigned for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat

Quadrangle	Township/ Range	Section	Area (acres)	
Fellows	T32S, R22E	2	528	
		12	640	
	T32S, R23E	4	280	
		5	80	
		7	176	
		9	160	
		18	400	
		20	480	
Maricopa	T11N, R24W	3	320	
		4	320	
		9	320	
		10	320	
		15	176	
	T12N, R24W	33	480	
	T32S, R23E	27	160	
		35	500	
	Pentland	T12N, R32E	32	640
	Caliente Mountain	T11N, R27W	19	600
29			336	
30			80	
32			192	
Peak Mountain	T11N, R27W	32	976	
Cuyama	T10N, R26W	1		
New Cuyama		2		
		3		
		4	1088	
		6		
		31		
		32		
	T10N, R27W	1	1088	
		3		
		34		
		35		
		36	1744	
Ballinger Canyon	T10N, R24W	18		
	Cuyama	T10N, R25W		8
		9		
		13		
		14		
		15		
		7	368	
Reward	T29S, R21E	33	120	
	T30S, R21E	1	420	
		2		
		3		
		4		624

Table 1. BLM lands of Bakersfield District, California, assigned for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat (continued)

Quadrangle	Township/ Range	Section	Area (acres)
Reward	T30S, R21E	9	704
		10	
	T30S, R22E	29	320
		30	304
		32	420
Panorama Hills	T31S, R22E	7	416
		8	160
		18	224
		20	528
Carneros Rocks	T29S, R20E	1	768
		2	768
		3	720
		10	520
		11	560
		12	368
		13	320
		14	160
		7	160
Kettleman Plain	T29S, R21E	20	640
	T22S, R18E	24	640
		28	640
		30	640
La Cima	T21S, R17E	34	320
	T22S, R17E	10	320
		12	160
	T22S, R18E	6	640
		8	640
		18	640
Avenal	T22S, R17E	4	320
Lokern	T24S, R22E	4	120
West Elk Hills	T30S, R22E	2	640
		4	640
		10	640
		22	640
	T31S, R23E	26	320
		6	480
		2	224
		4	336
Reward		5	100
Taft	T31S, R23E	10	480
		24	640
	T31S, R24E	20	320
Fellows	T31S, R22E	9	480
		12	320
		21	160

Table 1. BLM lands of Bakersfield District, California, assigned for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat (continued)

Quadrangle	Township/ Range	Section	Area (acres)
Fellows	T31S, R22E	22	160
		23	160
		24	480
		25	160
		27	480
		28	320
		33	768
		34	320
		35	352
		32	260
	T31S, R23E		

Table 2. Parcels of BLM land deleted from field surveys to determine potential critical habitat for the San Joaquin kit fox

Quadrangle	Township/ Range	Section	Area (acres)
Lokern	T29S, R22E	4	120
Reward	T30S, R22E	32	100
	T31S, R22E	5	48
		8	100
Maricopa	T12N, R24W	33	160
	T32S, R23E	35	160
	T32S, R22E	12	640
Caliente Mountain	T11N, R27W	19	600
		29	336
		30	80
New Cuyama	T10N, R26W T10N, R27W	2	1088
		1	
		3	
		34	
		36	
Cuyama	T10N, R26W	7	368
La Cima	T21S, R17E	34	80
Avenal	T22S, R17E	4	80

Table 3. Parcels of BLM land surveyed for their potential as San Joaquin kit fox critical habitat using modified techniques

Quadrangle	Township/ Range	Section	Remarks
Ballinger Canyon	T10N, R24W	13, 18	Ridgeline and wash survey
New Cuyama	T10N, R26W	3, 4, 6, 31	
New Cuyama	T10N, R27W	35	Surveyed ridge between jeep trails
Avenal	T22S, R17E	4	Surveyed 4 longest transects in triangular parcels
La Cima	T21S, R17E	34	

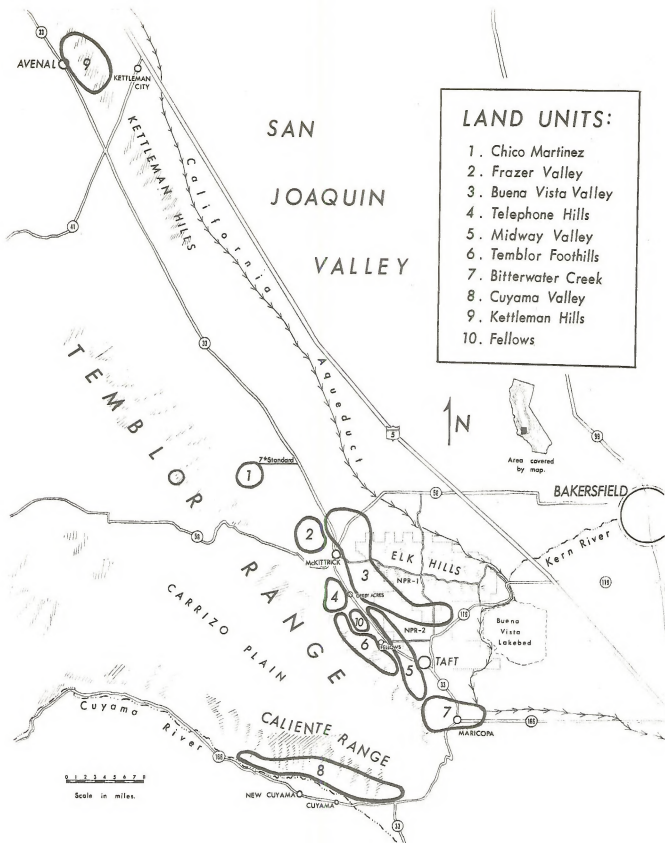


Fig. 1. Location of ten land units composed of parcels of BLM lands located in southwestern Kern County, California, that were surveyed in 1979 to determine their potential as San Joaquin kit fox critical habitat.



LAND UNIT 1. CHICO MARTINEZ

4344 acres in one BLM parcel including all or parts of nine sections in the Carneros Rocks quadrangle

T29S, R20E: Sections 1, 2, 3, 10, 11, 12, 13, 14

T29S, R21E: Section 7

Dates Surveyed: October 29, 30, 31, 1979

Total Score in Rating System = 5, ranked 5 of 10

This land unit was the largest intact parcel of BLM acreage surveyed, containing 4344 contiguous acres (Fig. 2). Because of its size, integrity, and location it formed an obvious geographical unit. Its topography consisted of wide valleys dotted with hills and steeper ridges, and it had an elevational range of 258-677 m (meters). Chico Martinez Creek, a major drainage, ran diagonally northeast across the land unit. This land unit was considered to be suitable for kit fox over most of its extent because of the gentle nature of the topography.

Vegetation was varied, with *Bromus rubens*/*Festuca* grassland predominating. Shrub cover was mostly restricted to slopes and rockier areas, with most sections having a diverse foothill-shrub association. A mixture of *Atriplex polycarpa* and *Hymenoclea salsola* was most common in gullies. *Atriplex spinifera* was present in some sections, particularly as second growth on old surface mines. Canyon slopes, particularly north and east exposures, were covered by a generally diverse mosaic of *Eriogonum fasciculatum*, *Eastwoodia elegans*, *Eurotia lanata*, *Gutierrezia bracteata*, *Haplopappus acradentus*, and *Isomeris arborea*. A *Bromus rubens*/*Eriogonum fasciculatum* association occurred on many southern exposures and on shaly outcrops.

The primary land use, and source of associated disturbances, was cattle grazing. The effects of grazing were most noticable in some areas of the valley floors, but trails were present on many ridges. Chico Martinez was assigned a score of 1 for moderate grazing overall, although intensity varied from heavy grazing in some localities to virtually none in others. A few oil wells in the northeast portion (rated 2 for light oil development), and small scattered areas of former surface mines along the perimeter were other sources of disturbance. On the whole, this land unit gave the impression of being relatively undisturbed.

Evidence of kit fox was very sparse: only one natal den was observed. The relative densities were 0.23/dens/1000 acres for both total dens observed and natal dens; therefore, Chico Martinez was rated 1 in both the "presence of species" and "breeding site" categories. Prey base in the form of lagomorphs was extremely scarce. Only six *Lepus* were seen during the daylight transects, and four were observed during the night spotlight survey, resulting in an observed density of 1.7 lagomorphs/1000 acres. Chico Martinez Creek was assigned a minimum value of 0 in the "prey base" category of the rating system.

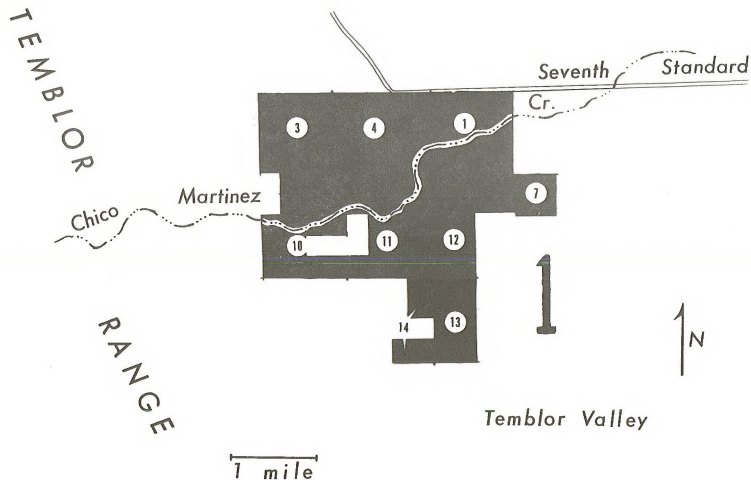


Fig. 2. Parcels of BLM land surveyed in Land Unit 1, Chico Martinez, in southwestern Kern County, California

## LAND UNIT 2. FRAZER VALLEY

1868 acres in four BLM parcels including all or parts of seven sections in the Reward quadrangle

T29S, R21E: Section 33

T30S, R21E: Sections 1, 2, 3, 4, 9, 10

Dates Surveyed: November 5, 6, 7, 1979

Total Score in Rating System = 3, ranked 8 of 10 with Fellows and Cuyama

This land unit consisted of four disjunct parcels having a total acreage of 1868 acres (Fig. 3). Frazer Valley was assigned a value of 0 for the space required to support and protect a breeding population of kit fox.

Topography consisted of rolling hills, small scarps, and valleys surrounding Frazer Valley, with an elevational range of 262-677 m. Topography was considered to be suitable (score of 2) for kit fox.

Vegetation consisted of a mixture of grassland and lower foothill-type shrub associations. Common species observed were *Bromus rubens*, *Schismus arabicus*, *Festuca* sp., *Atriplex polycarpa*, *Atriplex spinifera*, *Eastwoodia elegans*, *Eriogonum fasciculatum*, *Haplopappus acradeni*, *Isomeris arborea*, and *Gutierrezia bracteata*. *Eremocarpus setigerus* and *Salsola kali* were observed occasionally.

Major soil types appeared to be sandy clay with much shale.

This land unit is bordered on the east by an area of intensive gas and oil field development, and to the south by Highway 58 and agricultural developments in the Little Santa Maria Valley. Disturbances on the BLM parcels consisted of a few oil wells, and light-to-moderate grazing by cattle and sheep. Frazer Valley received ratings of 2 for both "oil development" and "grazing."

No evidence of kit fox was observed in this land unit (identifiable kit fox dens or scats), and it received a 0 in both "presence of species" and "breeding sites" categories. Lagomorph densities were not outstanding (10.2 lagomorphs/1000 acres), and the land unit was given a value of 1 in "prey base."

Frazer Valley was one of three land units receiving the lowest scores in the rating system, and was not recommended for consideration as critical habitat for the kit fox.

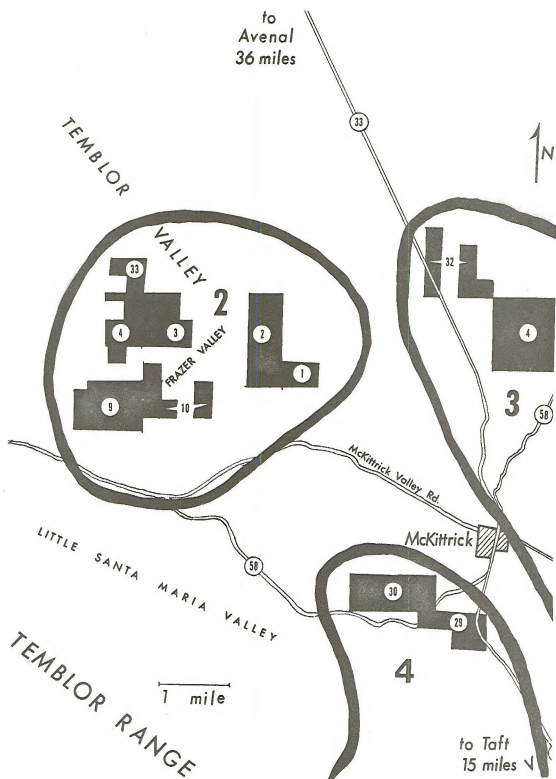


Fig. 3. Parcels of BLM land surveyed in Land Unit 2, Frazer Valley, in south-western Kern County, California

### LAND UNIT 3. BUENA VISTA VALLEY

5304 acres (5184 surveyed) in 15 BLM parcels including all or parts of 12 sections in the West Elk Hills, Fellows, Taft, Reward, and Lokern quadrangles

T29S, R22E: Sections 4, 32  
T30S, R22E: Sections 2, 4, 10, 22, 26  
T31S, R22E: Sections 2, 12  
T31S, R23E: Sections 6, 24  
T31S, R24E: Section 20

Dates Surveyed: September 10, 11, 12, 14, 19, and November 6, 1979

Total Score in Rating System = 11, ranked 1 of 10

Parcels in this land unit are spread over a large geographical area in a long, fairly continuous, crescent-shaped, alluvial plain ringing the southwest portion of the Elk Hills (Fig. 4). Total acreage is 5304 acres on 15 disjunct parcels, with four disjunct parcels of 640 acres each being the largest intact land areas. Due to the scattered nature of the acreage, this land unit was assigned a minimal value of 0 in "space requirement."

Buena Vista Valley parcels were characterized by low-relief topography, from gently rolling ridges to very flat valley floor, and an elevational range of 138-469 m. This topography was considered suitable (score of 2), and probably ideal, for kit fox. The southwestern seven parcels lie in the Buena Vista Valley proper, the central three in the McKittrick Valley (drained to the north into the Kern River), and the northern three 640-acre parcels actually lie in the Kern River drainage on the north side of the Elk Hills.

Vegetation in this land unit consisted largely of grassland and lower-foothill species, including *Bromus rubens*, *Schismus arabicus*, *Festuca* sp., *Plantago* sp., *Lepidium* sp., *Atriplex polycarpa*, *Atriplex spinifera*, *Gutierrezia bracteata*, *Eurotia lanata*, *Hymenoclea salsola*, *Isomeris arborea*, *Salsola kali*, *Eremocarpus setigerus*, and *Erodium cicutarium*.

The major soil type was alluvial clay and sand deposits.

The primary land use and source of disturbance in nine of the parcels was moderate-to-light oil development. The majority of these developed parcels appeared to be in a state of declining activity or abandonment. The most developed parcels were Section 26 in the McKittrick Valley and Section 24 in the Buena Vista Valley. The three northern parcels and Section 6 in the Buena Vista Valley had virtually no oil development. Overall, the Buena Vista land unit was given a rating of 2 for light oil development.

Evidence of grazing, mostly by sheep, was scarce in this land unit, and it was given a score of 2 for light grazing. The small western parcel in Section 32 at the extreme northern tip was bisected by Highway 33. Section 22 in the McKittrick Valley has Skyline Road, which has light traffic during the day, cutting through its southwest corner. The parcels in the southeastern corner of the land unit are near Elk Hills Road, which has heavy traffic. The Buena Vista Valley itself is probably the most protected area of valley bottom in this area, as regards developed roads and the hazards to wildlife associated with them. Only a long, untravelled dirt road with a locked gate at one end traverses the area between

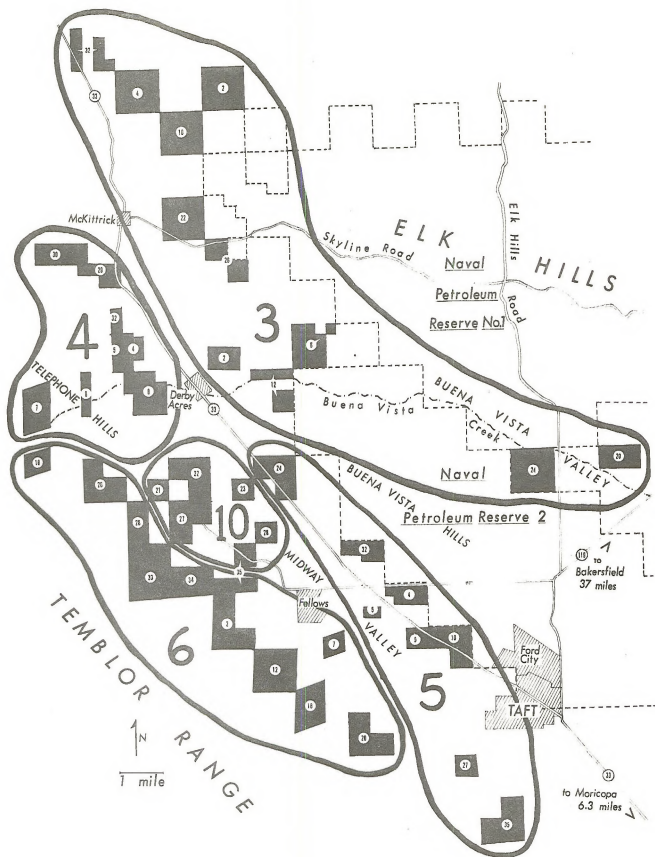


Fig. 4. Parcels of BLM land surveyed in the following land units: Land Unit 3, Buena Vista Valley; Land Unit 4, Telephone Hills; Land Unit 5, Midway Valley; Land Unit 6, Tumbler Foothills; and Land Unit 10, Fellows

the two Naval Petroleum Reserves. This valley provides the largest stretch of relatively undeveloped and undisturbed valley grassland habitat in the entire surveyed area.

Evidence of kit fox was frequently observed in all but the five northern parcels. Buena Vista Valley had the highest number of active natal kit fox dens (5) of any of the land units, and ranked second behind Bitterwater Creek with 0.96 natal dens/1000 acres. There were 3.09 total kit fox dens observed per 1000 acres. Observations of scats were frequent. Prey, in the form of lagomorphs, were abundant, and their relative densities were 35.0 lagomorphs/1000 acres. Buena Vista Valley was assigned scores of 3 for "presence of species," 3 for "breeding sites," and 3 for "prey base" in the rating system.

Because of its high total score of 11 and its proximity to other federal lands being considered for inclusion into a system of protected kit fox habitats, the Buena Vista Valley Land Unit was assigned highest priority for consideration by the BLM, Bakersfield District, as critical habitat.



#### LAND UNIT 4. TELEPHONE HILLS

2116 acres (1868 surveyed) in nine BLM parcels including all or parts of eight sections in the Panorama Hills, Reward, West Elk Hills, and Fellows quadrangles

T30S, R22E: Sections 29, 30, 32

T31S, R22E: Sections 4, 5, 7, 8, 9

Dates Surveyed: September 12, 27, and November 1, 5, 1979

Total Score in Rating System = 8, ranked 3 of 10

Telephone Hills was the third smallest land unit (see Fig. 4). The largest intact parcel consisted of 1016 acres in Sections 4, 5, 9, and 32 in the south Telephone Hills at the head of Buena Vista Creek. Due to the disjunct nature of the parcels and the small acreage involved, this land unit was assigned the minimum value of 0 for the desirable amount of space to support a kit fox breeding population.

Topography in this land unit included mostly rolling hills and canyons with an elevational range of 400-754 m. It was considered suitable for kit fox habitat over most of its area, and was given a score of 2 for topography. The northern parcel of 624 acres in Sections 29 and 30 lies in the south Telephone Hills west of the town of Derby Acres, and the remaining two parcels lie in the northeast-running canyons north of Crocker Canyon.

Vegetation in this unit consisted mostly of annuals. Shrub diversity and cover was particularly low in Section 7 and 8, north of Crocker Canyon. Shrub diversity increased in the hills directly west of Derby Acres. Species noted in this land unit included: *Bromus rubens*, *Schismus arabicus*, *Festuca* sp., *Lepidium* sp., *Atriplex polycarpa*, *Atriplex spinifera*, *Eurotia lanata*, *Salsola kali*, *Eremocarpus setigerus*, *Erodium cicutarium*, and a suffrutescent perennial *Astragalus*.

The major soil type was clay. Shale and gypsophyllous deposits were found in the northernmost parcel near McKittrick.

The primary source of disturbance was grazing by sheep, but there was some evidence of cattle grazing in the sections north of Crocker Canyon. Telephone Hills was assigned an overall score of 1 for moderate grazing. In Sections 29 and 30, the northern parcel in this land unit, disturbances from oil development, including many roads, wells, sumps, and increased human activities, were moderate. This area was also moderately grazed. Oil development in the southern parcels was limited to one small corner at the far south end of the southeast parcel. Overall, the Telephone Hills Land Unit was given a score of 1 for moderate oil development.

Evidence of kit fox in the Telephone Hills Land Unit was limited to the southern parcels. The relative density of dens was 0.54 and 2.68/1000 acres for natal and total dens respectively; therefore, the land unit was rated 3 for "presence of species" and 1 for "breeding sites." Kit fox scats were frequently observed in the southern parcels, especially in the hills just west of Derby Acres. Prey base in the form of rabbits was good; relative density was 45.0 lagomorphs/1000 acres. However, most of the rabbits were observed in the disturbed northern parcel. Telephone Hills was rated 3 for "prey base."



Although kit fox are obviously using portions of this land unit, it was not given a high priority for protection as critical habitat. The BLM may want to consider some protection for the southern three parcels of land, but there is little justification for managing the more disturbed parcel near McKittrick as critical habitat, since we found no evidence of kit fox use there.

## LAND UNIT 5. MIDWAY VALLEY

2400 acres (2240 surveyed) in seven BLM parcels including all or parts of eight sections in the Fellows, Taft, and Maricopa quadrangles

T31S, R22E: Section 24

T31S, R23E: Section 32

T32S, R23E: Sections 4, 5, 9, 10, 27, 35

Dates Surveyed: September 12, 13, 14, and October 22, 23, 1979

Total Score in Rating System = 6, ranked 4 of 10

This land unit consisted of 2400 acres in the Midway Valley, in 7 disjunct BLM parcels (see Fig. 4). The largest continuous parcel was 640 acres in Sections 9 and 10 just northwest of Taft. Because of insufficient continuous acreage to support and protect a breeding population of kit fox, this unit was assigned a minimum value of 0.

Topography was flat in all but two parcels, Sections 35 and 27, in the hills south of Taft; elevational range was 300 to 615 m, and all parcels except the above-mentioned were below 400 m. Topography was considered suitable for kit fox throughout this land unit.

Vegetation in the flat parcels consisted of species typical of valley floor habitat: *Bromus rubens*, *Schismus arabicus*, *Festuca* sp., *Plantago* sp., *Lepidium* sp., *Atriplex polycarpa*, *Gutierrezia bracteata*, *Hymenoclea salsola*, and *Isomeris arborea*. Many of the flat parcels also had a large, diverse complement of weedy species typical of disturbed habitats: *Salsola kali*, *Eremocarpus setigerus*, *Centaurea melitensis*, and *Helianthus annuus*. The two hilly parcels included most of the nonweedy species listed above, as well as greater shrub diversity, which is characteristic of the foothills. Shrub species observed were *Atriplex spinifera*, *Eriogonum fasciculatum*, *Eurotia lanata*, and *Eastwoodia elegans*.

Soils were mostly of the sandy or clay alluvial type.

The primary source of disturbance in the Midway Valley is past and present oil development. This land unit was treated separately from the Fellows region primarily because oil development in the Midway Valley and unit seems to be less intensive. On many parcels, oil field development is either declining or has been abandoned. Highway 33 seemed to be a suitable dividing line between the intensively developed oil fields in the northern Midway Valley, Fellows Land Unit, and the less active, less disturbed oil leases of the Midway Valley Land Unit. This unit was assigned a value of 1, for moderate oil development, and a value of 2 for light grazing because of some signs of sheep in a few parcels.

Evidence of kit fox use was abundant, but it consisted only of single and multiple hole dens: no natal dens were observed. Midway Valley had the highest density of non-natal dens with 4.46 dens/1000 acres. Scats were frequently observed. Rabbits were extremely abundant, and a relative density of 44.6 lagomorphs/1000 acres was estimated. In the rating system Midway Valley was given a score of 3 for "presence of species," 0 for "breeding sites," and 3 for "prey base."

Midway Valley was given a low priority recommendation for consideration as kit fox critical habitat. As the area recovers from the effects of oil development, it may become important valley floor habitat for the kit fox.

#### LAND UNIT 6. TEMBLOR FOOTHILLS

4528 acres (3888 surveyed) in eight BLM parcels including all or parts of 11 sections in the Fellows and Panorama Hills quadrangles

T31S, R22E: Sections 18, 20, 28, 33, 34, 35

T32S, R22E: Sections 2, 12

T32S, R23E: Sections 7, 18, 20

Dates Surveys: September 13, 20, 25, 26, October 23, 24, 25, and November 1 and 2, 1979

Total Score in Rating System - 4, ranked 6 of 10 with Kettleman Hills

The Temblor Foothills land unit consists of 4528 acres on eight BLM parcels in the steep foothills of the Temblor range, above Midway Valley (see Fig. 4). The largest continuous parcel of land is 1920 acres. Although this land unit makes up a fairly continuous band at the base of the mountains, many parcels touch only at their corners; therefore, this land unit was given a minimum value of 0 for the space requires to support a kit fox population.

Parcels in this land unit consist mostly of very steep but rounded ridges and hills, some very deep canyons, and an elevational range of 462 to 815 m. Although there are areas in some parcels that offer more gently rolling valleys, this land unit was considered to be unsuitable as kit fox habitat over most of its extent, and it was one of two land units given a minimum value of zero in this rating category.

Vegetation on many of these parcels consisted solely of dense grasses, *Bromus rubens*, *Schismus arabicus*, and *Festuca* species. The winter annuals observed here were more diverse than in other land units surveyed, but because these plants were dead and disintegrated no attempt was made to collect or identify them. The sparse shrub cover consisted primarily of *Haplopappus acradenius* and *Gutierrezia bracteata*, and *Atriplex polycarpa* was occasionally abundant in washes and at lower elevations. In areas of higher elevation, particularly on steep east and north-facing canyon slopes, vegetative cover was locally dense and diverse, and included the grass species noted above as well as *Eriogonum fasciculatum*, *Eurotia lanata*, and *Eastwoodia elegans*. In section 33, Dabney Canyon was the major land feature. Its incredibly steep and tall sides were covered by a strikingly dense and diverse mosaic of shrubs that included most of the above species plus *Haplopappus linearifolius* and *Ephedra californica*. Shrub diversity definitely increased with elevation.

Soils were mostly clay-based and included some local areas of gypsophyllous shales and a few sandstone outcrops.

Over most of the Temblor Foothills Land Unit cattle grazing was the primary source of disturbance, but because of the steepness of most of this area, it was largely restricted to the wider valleys and low-lying areas. Overall, this land unit was rated 1 for moderate grazing. The small parcel in the lower foothills of Section 7 of the Fellows quadrangle had moderate oil development. Two other sections had a few wells but overall, oil development was not a major factor here, and the land unit was rated 2 for light development. This unit was far from any major roads, and only dirt roads provided access.

Positive evidence of kit fox was scarce, and many unidentified, single-hole dens, probably badger holes, were present in some areas. Only six identifiable kit fox dens were observed (1.54 dens/1000 acres), and the land unit was given a score of 1 for "presence of species." No kit fox scats were seen in many of the higher parcels. The land unit had a relative density of 0.51 natal dens/1000 acres, and was scored 1 in the "breeding sites" category. Rabbits were not abundant (10.0 lagomorphs/1000 acres), and Temblor Foothills was given a 1 for "prey base."

This land unit was given a low priority recommendation for consideration as kit fox critical habitat.

## LAND UNIT 7. BITTERWATER CREEK

2596 acres (2436 surveyed) in two BLM parcels including all or parts of seven sections in the Maricopa and Pentland quadrangles

T11N, R24W: Sections 3, 4, 9, 10, 15

T12N, R23W: Section 32

T12N, R24W: Section 33

Dates Surveyed: October 15, 16, 22, 25, 1979

Total Score in Rating System = 9, ranked 2 of 10

This land unit consists of two BLM parcels totalling 2596 acres (Fig. 5). All but the Pentland parcel form one continuous block of 1956 acres at the extreme southeastern tip of the Temblor Range, southwest of Maricopa, that drain east into Bitterwater Creek and the Maricopa flats. The distinctive feature of this parcel was the crescent-shaped series of east-running ridges and their accompanying alluvial plain. Topographically, this parcel offers both moderate to steeply sloping ridges and flat alluvial plain habitat having an elevational range of 323 to 573 m. The Pentland parcel lies in the Maricopa flats with an elevational range of 153 to 184 m. Topography over the entire land unit was suitable for kit fox habitat, and it was given a score of 2 in this category.

Vegetation was varied, and shrub diversity was considered to be good in all but the Pentland parcel. Species present in the large parcel included *Bromus rubens*, *Schismus arabicus*, *Festuca* sp., *Atriplex polycarpa*, *Atriplex spinifera*, *Eriogonum fasciculatum*, *Eurotia lanata*, *Eastwoodia elegans*, and *Gutierrezia bracteata*. The Pentland parcel had less plant diversity because it was in a low-lying disturbed area. Species observed were *Bromus rubens*, *Schismus arabicus*, dense second growth *Atriplex polycarpa*, *Haplopappus acradenioides*, *Salsola kali*, and *Centaurea melitensis*.

Soils were variable. In some places there were large, conspicuous bands of gypsophyllous shale strata. Pentland had alluvial clay soils.

Disturbances in the larger parcel consisted primarily of dust associated with a large, active surface mine just outside of the parcel to the north. There was considerable traffic by heavy trucks along a dirt road at the base of the hills. Some evidence of light grazing was also noticed, but there was no oil development. Pentland, on the other hand, had at one time been extremely disturbed by oil development, and oil leases in the western portion of the parcel are still active. Most of the Pentland parcel appears to be gradually recovering. The Pentland and larger parcel together were given a 1 for moderate oil development, and a 2 for light grazing, but these two parcels should be considered separately.

Evidence of kit fox was abundant in the larger parcel. Breeding animals were obviously present here also, because four active natal dens were observed. Observations of scats in the larger parcel were frequent. Very little evidence of kit fox was found in the Pentland section. Den observations for both parcels gave estimated densities of 3.28 dens/1000 acres, and 1.64 natal dens/1000 acres, and this land unit was given a score of 3 in both the "presence of species" and "breeding sites" categories. Bitterwater Creek Land Unit was given a score of 1 for "prey base" (9.0 lagomorphs/1000 acres). Rabbits were much more common in the Pentland parcel.

This land unit was recommended for consideration as critical habitat for the kit fox.

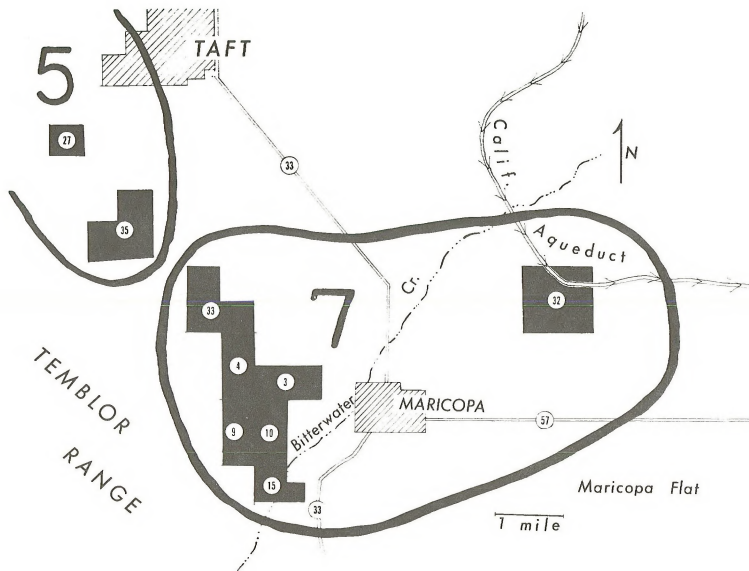


Fig. 5. Parcels of BLM land surveyed in Land Unit 7, Bitterwater Creek, in southwestern Kern County, California

#### LAND UNIT 8. CUYAMA VALLEY

5384 acres (2912 surveyed) in seven BLM parcels including all or parts of 23 sections in the Caliente Mountain, Peak Mountain, New Cuyama, Cuyama, and Ballinger Canyon quadrangles

T10N, R24W: Section 18

T10N, R25W: Sections 7, 8, 9, 13, 14, 15

T10N, R26W: Sections 1, 2, 3, 34, 35, 36

T11N, R27W: Sections 19, 29, 30, 32

Dates Surveyed: October 1, 2, 3, 4, 9, 10, 11, 1979

Total Score in Rating System = 3, ranked 8 of 10 with Fellows and Frazer Valley

This large land unit consisted of 5384 acres in a narrow strip at the north side of Cuyama Valley (Fig. 6). The largest continuous area under BLM jurisdiction was 1744 acres. Due to the disjunct nature and narrow width of the acreage, this land unit was given a score of 0 for adequate space to support a kit fox population.

The most striking feature of this land unit is its extremely steep and rugged topography (Fig. 7). All parcels lay along the steep southern scrap of the Caliente Range that forms the northern border for the Cuyama Valley. With an elevational range between 578 and 1135 m, this land unit had the highest elevation of any surveyed.

The higher elevational range was reflected in the vegetation, which was the most diverse encountered and included two species (*Yucca whippleyi* and *Juniperus californicus*) characteristic of higher elevations. Among the species observed were *Bromus rubens*, *Schismus arabicus*, *Festuca* sp., *Plantago* sp., *Atriplex polycarpa*, *Hymenoclea salsola*, *Gutierrezia bracteata*, *Eriogonum fasciculatum*, *Eurotia lanata*, *Eastwoodia elegans*, *Haplopappus linearifolius*, *Ephedra californica*, and *Erodium cicutarium*. Vegetation along the wash bottoms was much less diverse due to cattle grazing and included only *Atriplex* and *Hymenoclea*. Soils were quite variable and several areas had shale outcrops and contact zones. Vegetation changes were often associated with soil changes.

The only disturbance present in this land unit was moderate to heavy grazing by cattle. Most grazing was concentrated along the flats and in the broader wash bottoms, but trails were present along most of the ridges. Sheep had denuded the only flat areas of valley bottom. The Cuyama Valley Land Unit was rated 1 for moderate grazing, and 3 for no oil development.

Evidence of kit fox was extremely scarce, and only two dens (0.69 dens/1000 acres) were observed. No natal dens were found, and very few scats were observed. Cuyama Valley was rated 1 for "presence of species," and 0 for the "presence of breeding sites." Prey base was also scarce; only 19.2 lagomorphs/1000 acres were observed.

This land unit was not recommended for consideration as kit fox critical habitat.

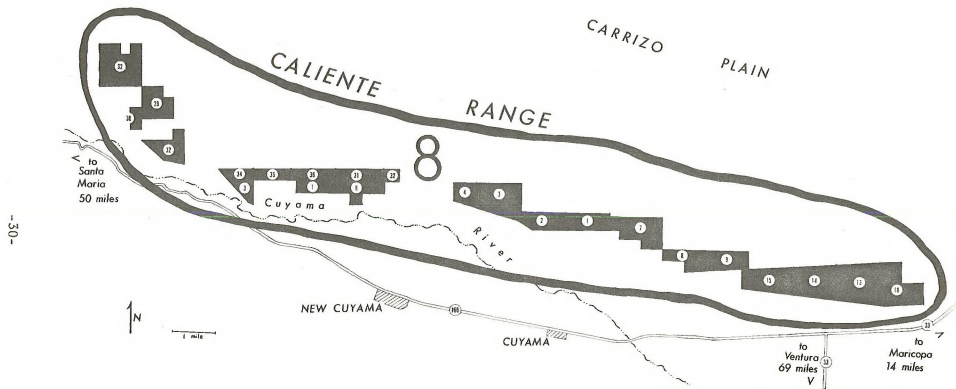


Fig. 6. Parcels of BLM land surveyed in Land Unit 8, Cuyama Valley, in south-western Kern County, California





Fig. 7. Typical of the steep, high relief terrain in the Cuyama Valley Land Unit is this transect being walked by one of the field crew. Prescribed transect techniques were altered in these parcels to allow reasonable coverage without endangering safety of the staff. Many acres were judged to be too steep for potential kit fox habitat and were deleted from the survey.

## LAND UNIT 9. KETTLEMAN HILLS

5680 acres (5520 surveyed) in 11 BLM parcels including all or parts of 11 sections in the Kettleman Plain, La Cime, and Avenal quadrangles

T21S, R17E: Section 34

T22S, R17E: Sections 4, 10, 12, 24

T22S, R18E: Sections 6, 8, 18, 20, 28, 30

Dates Surveyed: November 13, 14, 15, 16, 1979

Total Score in Rating System = 4, ranked 6 of 10 with Temblor Foothills

This land unit, consisting of 5680 acres on 11 BLM parcels (Fig. 8), was the northernmost land unit surveyed. It lay approximately 70 miles north of Taft and the center of all other units surveyed. Much of the acreage was in large but disjunct parcels. Seven out of 11 areas surveyed were 640-acre sections arranged in a checkerboard pattern with sections of privately-owned land. This land unit was given a rating of 0, because the acreage involved and its dispersed nature made it undesirable in terms of the space required to support and protect a kit fox breeding population.

The Kettleman Hills Land Unit consists of fairly rugged, much dissected terrain that becomes more rolling around the perimeter. All surveyed parcels lay in the north dome of the Kettleman Hills at an elevational range of 160 to 385 m. Topography was considered to be suitable for kit fox over the entire land unit, and it was given a score of 2 in this category.

Vegetation in the Kettleman Hills was monotonous. A grazed understory of annual grasses, *Bromus rubens*, *Festuca* sp., and *Schismus arabicus*, was present throughout. The *Festuca* sp., appeared to be more common here than they were in the southern land units. The shrubs present were those generally found in lower elevations: *Atriplex polycarpa*; *Hymenoclea salsola*; *Gutierrezia bracteata*; and *Eriogonum fasciculatum*. *Salsola kali* and *Eremocarpus setigerus* were also widespread.

Soils were derived from alluvial clay and sandstone deposits. Marine fossils and bluish sandstone outcrops were locally common.

The most obvious disturbance to this area was widespread, often intensive, grazing by sheep. Some area, particularly the southwestern parcels, were extremely overgrazed. Whole hilltops were denuded and sheep trails criss-crossed everywhere. This land unit was the most heavily grazed of any surveyed, and was given a minimal score of 0 in "grazing."

The Kettleman Hills area is also an oil producing field, and much of the land surveyed is being leased by the Standard Oil Company. Disturbances from oil development varied from parcel to parcel; therefore, this land unit was given an average score of 1 for moderate oil development. Other disturbances noted were off-road dirt bikes, range fires, and noxious fumes from a toxic waste disposal site in the southeast part of the unit.

Evidence of kit fox was scarce over the land unit as a whole. The four natal den sites were found in one parcel (Section 10); therefore, the relative density estimate of 0.72 natal dens/1000 acres for the land unit as a whole is misleading. The relative density for dens of all categories on the Kettleman

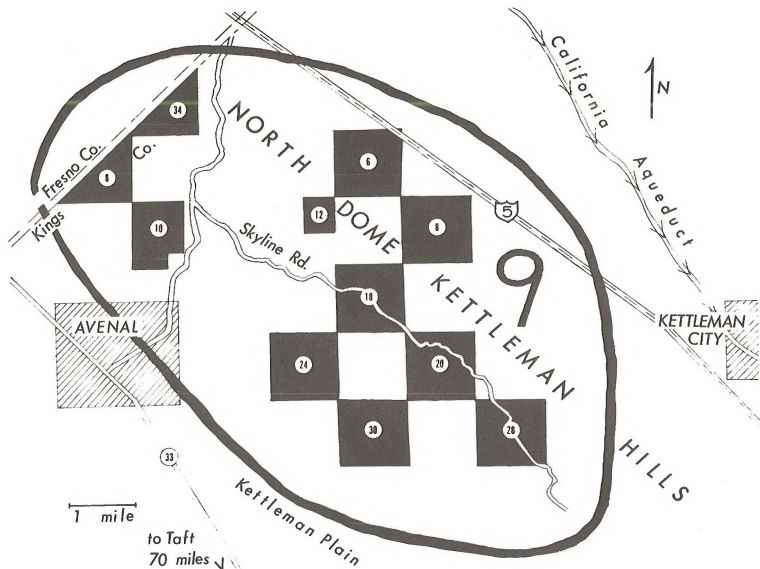


Fig. 8. Parcels of BLM land surveyed in Land Unit 9, Kettleman Hills, in southwestern Kern County, California

Hills were 1.63 dens/1000 acres. Evidence of kit fox scats was infrequent and localized. Prey were not abundant (with 7.4 lagomorphs/1000 acres), and the land unit was given a score of 1 in "prey base."

This land unit was given a low to intermediate recommendation for consideration as kit fox critical habitat. The area in which all the natal dens were observed was recommended for special management protection to reduce disruptions of breeding animals.

#### LAND UNIT 10. FELLOWS

1600 acres in six BLM parcels including all or parts of six sections in the Fellows quadrangle

T31S, R22E: Sections 21, 22, 23, 25, 27, 35

Dates Surveyed: September 13, 17, 21, 1979

Total Score in Rating System = 3, ranked 8 of 10 with Frazer Valley and Cuyama Valley

This was the smallest land unit surveyed, consisting of 1600 acres on six BLM parcels, and the largest continuous area was 960 acres (see Fig. 4). Due to its small size, this land unit was given a rating of 0 for space required to maintain a kit fox population.

This was also the most level of all land units. It included flat bottom lands with a few hills in the peripheral parcels. The elevational range was between 400 and 569 m. Topographically, the Fellows Land Unit was considered suitable for kit fox and received a score of 2 in this rating category.

The uniform vegetation was notable because of a large complement of weedy species that probably indicate past disturbances. Common species observed were *Bromus rubens*, *Atriplex polycarpa* (which in many parts formed dense second growth thickets), *Gutierrezia bracteata*, and *Isomeris arborea*. The list of common weedy species consisted of *Salsola kali*, *Eremocarpus setigerus*, *Centaurea melitensis*, *Ambrosia acanthicarpa*, *Helianthus annuus*, *Datura stramonium*, and *Erodium cicutarium*.

Soils were an alluvial clay-type, and much surface disturbance was observed.

This was an area of incredibly intensive oil development, and was by far the most disturbed land unit surveyed (Fig. 9). This land unit was used as the standard for extensive oil development and was given the minimal value of 0 in the "oil development" category. No signs of grazing were noticed, but there was little vegetation present in some areas; therefore, the "grazing" category was rated "not applicable" for the Fellows Land Unit and it received a score of 0.

Evidence of kit fox was almost nonexistent. Only one single-hole inactive den was found in a peripheral parcel of land; therefore, the relative density value was 0.625 den/1000 acres. Fellows was scored a 1 for "presence of species," and 0 for "presence of breeding sites." Prey base was fairly abundant (37.5 lagomorphs observed/1000 acres), and the land unit was scored as a 3 in "prey base."

The Fellows Land Unit was not recommended as critical habitat for the San Joaquin kit fox.



Fig. 9. Destruction of native habitats in the Fellows Land Unit was almost universal. Venting of poisonous gases illustrated here was only one of the serious sources of pollution and environmental impacts observed.

### 3.1 CRITICAL HABITAT RATING SYSTEM

#### 3.1.1 Presence of Species

The most important criterion for ranking the ten land units for presence of species was the relative density of active and inactive kit fox dens observed on the field transects. The data describing each observed den were transcribed on den summary sheets, which are grouped by land unit and found in Appendix A. These sheets contain all information on both known kit fox dens and unidentified dens. Every den has been coded to facilitate cross-referencing with the summary sheets, entries in the permanent field ledger books, and the den locations plotted on the permanent topographic maps.

The data on known kit fox dens have been further synthesized and presented in Table 4, which includes the number of dens of each type and their estimated relative density, expressed as the number observed per 1000 acres. These figures have been computed for each land unit and for the total area surveyed.

A total of 58 kit fox dens were positively identified during the survey; therefore, the estimated relative density for all land units combined was 1.8/1000 acres. The highest concentration of non-natal dens was found in the Midway Valley Land Unit: 4.0/1000 acres. The greatest estimated density of natal dens was in the Bitterwater Creek Land Unit: 1.6/1000 acres. By comparison Elk Hills had estimated relative densities of 12.9 and 1.5/1000 acres for non-natal and natal dens, respectively.

When all types of kit fox dens were combined, the Midway Valley, Buena Vista Valley, Bitterwater Creek, and Telephone Hills Land Units had the highest estimated relative densities of 4.4, 3.2, 3.2, and 2.6/1000 acres, respectively. They were therefore given scores of 3 in "presence of species."

Since no kit fox dens were observed in the Frazer Valley Land Unit, and only one inactive, single-hole den was observed in the Fellows Land Unit, they received scores of 0 for "presence of species."

The other land units had estimated densities below the overall average of 1.8/1000 acres, and were given scores of 1.

#### 3.1.2 Breeding Sites

Land units were scored in the "breeding sites" category according to the relative densities of active natal dens observed during the field surveys. Data in Table 4 indicate that the Buena Vista Valley and Bitterwater Creek Land Units had the highest densities of active natal dens, 1.6 and 1.0/1000 acres respectively, and they were given the highest scores of 3. Low densities of active natal dens were found on the Chico Martinez, Telephone Hills, Temblor Foothills, and Kettleman Hills Land Units, and they were given scores of 1. The other land units received scores of 0, as no active natal dens were observed on them.

Table 4. Synthesis of the type, numbers and relative densities of San Joaquin kit fox dens found in 10 land units in the BLM, Bakersfield, California District in 1979

Land Unit	Natal				Multiple-Hole				Single-Hole				Total	
	Active		Inactive		Active		Inactive		Active		Inactive			
	N	RD	N	RD	N	RD	N	RD	N	RD	N	RD	N	RD
Chico Martinez	1	0.2											1	0.2
Frazer Valley													0	
Buena Vista Valley	5	1.0	2	0.4	4	0.8			4	0.8	1	0.2	16	3.2
Telephone Hills	1	0.5					3	1.6	1	0.5			5	2.6
Midway Valley			1	0.4	3	1.3			4	1.8	2	0.9	10	4.4
Temblor Foothills	2	0.5			2	0.5			2	0.5			6	1.5
Bitterwater Creek	4	1.6							4	1.6			8	3.2
Cuyama Valley					2	0.7							2	0.7
Kettleman Hills	4	0.7			3	0.5	1	0.2	1	0.2			9	1.6
Fellows											1	0.6	1	0.6
Total	17	0.5	3	0.1	14	0.4	4	0.1	16	0.5	4	0.1	58	1.8
Elk Hills*		1.1		0.4		3.7		1.8		5.2		2.2		14.4

N = Number

RD = Relative density expressed as number per 1000 acres

\*Data provided to allow comparisons with an area of above average kit fox habitat.



### 3.1.3 Prey Base

The relative densities of black-tailed jackrabbits, *Lepus californicus*, and cottontail rabbits, *Sylvilagus*, were used to score land units as regards one aspect of prey availability. The number of lagomorphs observed within each parcel contributing to a land unit were tallied to provide a total for the land unit. These data, expressed as the numbers observed per 1000 acres, are summarized in Table 5. Information from Elk Hills is also included to allow comparison with an area that had above-average kit fox and lagomorph densities in 1979.

The Telephone Hills, Midway Valley, Fellows, and Buena Vista Valley Land Units had the highest relative densities of total lagomorphs observed: 45.0, 44.6, 37.5, and 34.8/1000 acres, respectively. These densities compare favorably with Elk Hills densities of 42.9 lagomorphs per 1000 acres. The four land units were given a score of 3 in the "prey base" category.

The proportions of jackrabbits and cottontails to the 10 land units did not remain constant. With 28.9 and 26.7 *Lepus* per 1000 acres, the Telephone Hills and Buena Vista Valley Land Units had the highest relative densities of jackrabbits

Table 5. Ratings of land units in the Bureau of Land Management, Bakersfield District, California, as potential kit fox critical habitat based on observations of lagomorphs (number/1000 acres)

Land Unit	<i>Lepus californicus</i>	<i>Sylvilagus auduboni</i>	Lagomorphs
Chico Martinez	1.5	0.2	1.7
Frazer Valley	9.6	0.5	10.1
Buena Vista Valley	26.7	8.1	34.8
Telephone Hills	28.9	16.1	45.0
Midway Valley	16.5	28.1	44.6
Temblor Foothills	5.1	4.9	10.0
Bitterwater Creek	6.6	2.5	9.1
Cuyama Valley	13.7	5.5	19.2
Kettleman Hills	5.1	2.3	7.4
Fellows	16.9	20.6	37.5
Average Densities	11.5	6.7	18.3
Elk Hills NPR-1*	28.4	14.5	42.9

\*Surveyed in 1979 using same field techniques, provided for comparison with an area known to support high populations of kit fox.

observed, 2.5 times greater than the overall average. Midway Valley and Fellows Land Units had the highest relative densities of *Sylvilagus* observed: 28.1 and 20.6/1000 acres, respectively.

Lagomorph densities on Chico Martinez were so low, 1.7/1000 acres, that this unit was assigned a score of 0 for "prey base." The other five land units received scores of 1, since they had lagomorph densities between the high and low values described above.

#### 3.1.4 Space

Management of kit fox populations and critical habitats implies that parcels of land recommended for protection are large enough to support a reasonable number of kit fox in a breeding, self-sustaining mode. Except for Chico Martinez, the BLM lands surveyed in the southern San Joaquin Valley were scattered and small (Table 6). The average size of the largest, intact parcels in the nine land units was 1090 acres; most other parcels were less than 640 acres. Because of their limited acreages and disjunct nature, nine land units were given scores of 0 as regards "space" to maintain kit fox populations.

Table 6. Ratings of land units in the Bureau of Land Management, Bakersfield District, California, as potential San Joaquin kit fox critical habitat based on their size

Land Unit	Area (acres)	Largest Contiguous Area (acres)	Discontinuous Parcels	
			Number	Average Area (acres)
Chico Martinez	4,344	4,344		
Frazer Valley	1,868	744	6	187
Buena Vista Valley	5,304	640	15	354
Telephone Hills	2,116	916	8	150
Midway Valley	2,400	640	9	267
Temblor Foothills	4,528	1,920	7	373
Bitterwater Creek	2,546	1,936	8	76
Cuyama Valley	5,384	1,744	6	607
Kettleman Hills	5,680	640	11	516
Fellows	1,600	960	5	128
Elk Hills*	46,320	46,320		

\*Surveyed using same techniques, 1979, data provided to allow comparisons with an area supporting above-average populations of kit fox.

The Chico Martinez Land Unit included 4344 contiguous acres of potential kit fox habitat. Since we are unsure whether even this acreage can support a self-sustaining population of kit fox and its prey base, we assigned Chico Martinez a score of 1 for "space." In comparison, the Elk Hills, NPR-1, includes a contiguous land area of 46,320 acres under federal control.

### 3.1.5 Other Habitat Parameters — Grazing

The effects of grazing, oil development, and topography on San Joaquin kit fox habitats were evaluated under the "other habitat parameters" category of the rating system. Fellows was virtually devoid of vegetation and probably couldn't support grazing in this area of intensive oil development. Kettleman Hills has been heavily grazed by sheep and some cattle. Both land units were given scores of 0, Fellows because it can't support grazing, and Kettleman Hills because its kit fox habitat has probably been the most negatively impacted by heavy grazing.

Frazer Valley, Buena Vista Valley, Midway Valley, and Bitterwater Creek have received only light grazing pressure and were assigned scores of 2. By comparison, Elk Hills, where no grazing is allowed, received a maximum score of 3. The other land units were receiving moderate grazing and received scores of 1 each (Table 7).

Table 7. Ratings of land units in the Bureau of Land Management, Bakersfield District, California, as potential San Joaquin kit fox critical habitat, based on "other habitat parameters"

Land Unit	Grazing <sup>1</sup>	Oil <sup>2</sup>	Topography <sup>3</sup>	Cumulative Score	Overall <sup>4</sup> Score
Chico Martinez	1	2	2	5	2
Frazer Valley	2	2	2	6	2
Buena Vista Valley	2	1	2	5	2
Telephone Hills	1	1	2	4	1
Midway Valley	2	1	2	5	2
Temblor Foothills	1	2	0	3	1
Bitterwater Creek	2	1	2	5	2
Cuyama Valley	1	3	0	4	1
Kettleman Hills	0	1	2	3	1
Fellows	0	0	2	2	0
Elk Hills <sup>5</sup>	3	1	2	6	2

<sup>1</sup>Heavy grazing = 0    Moderate grazing = 1    Light grazing = 2    No grazing = 3

<sup>2</sup>Extensive development = 0    Moderate development = 1    Light development = 2  
No development = 3

<sup>3</sup>Unsuitable topography = 0    Suitable topography = 2

<sup>4</sup>Cumulative score 0-2 = 0; 3-4 = 1; 5-6 = 2; 7-8 = 3

<sup>5</sup>Surveyed using same techniques in 1979, provided for comparison as an area known to support high populations of kit fox.

### 3.1.6 Oil Development

We assume that once an unknown threshold is reached, increasing intensities of oil developments have negative impacts on kit fox critical habitats. For purposes of this study, intensity of petroleum development was defined, based on our field observations, as follows: light development disturbed less than 10% of the native habitat and usually included one to fourteen oil field structures per section; moderate development disturbed 10-15% of the native habitat and could include between 15 and 29 structures per section; while heavy development destroyed more than 15% of the habitat and often included more than 30 structures per section.

While we have included densities of structures in our definitions, we believe it is more meaningful to describe levels of petroleum field development in terms of total area of habitat disturbed or destroyed. Increasing densities of structures are not always directly related to the proportion of habitat destroyed for the following reasons: sizes of well pads are not consistent; clearings associated with pumping stations, tank settings, LACT's, and pipelines, all considered to be equivalent structures, differ in total area; overzealous clearing of land not directly associated with structures has taken place on BLM lands such as those in the Fellows Land Unit; road networks vary from the minimum necessary to service pumps to a maze leading throughout the land parcel; and impacts associated with developments in more rugged terrain are greater in area than those associated with similar developments in gentler topography.

These subjective definitions of intensity of oil field developments were useful in comparing the potential of these BLM land parcels as kit fox critical habitat. However, the reader should not forget that the fundamental question of how, and to what degree, various levels of petroleum development impact the San Joaquin kit fox and its critical habitat has not been answered.

Owing to extensive oil developments, Fellows received a score of 0. There was no oil development of Cuyama Valley and it was given a score of 3. The Chico Martinez, Frazer Valley, and Temblor Foothills Land Units were judged to have only light developments and received scores of 2; the remaining five land units received scores of 1, indicating moderate oil development (Table 7). Elk Hills also received an overall score of 1 for moderate oil development, although the actual intensity varies from extensive to none over large areas.

### 3.1.7 Topography

The steep, rugged relief of the Cuyama Valley and Temblor Foothill Land Units was unsuitable for San Joaquin kit fox, and these units were given scores of 0 in topography. All other land units received scores of 2 to indicate overall suitable terrain for kit fox (Table 7).

### 3.1.8 Cumulative Scores — Other Habitat Parameters

The cumulative scores under the "grazing," "oil development," and "topography" categories were summed for each land unit (Table 7). None of the land units had a cumulative score of 7 or 8, which would have gained them an overall score of 3 in the "other habitat parameter" category of the rating system. Chico Martinez, Frazer Valley, Buena Vista Valley, Midway Valley, and Bitterwater Creek had high cumulative scores of 5 or 6, comparable with Elk

Hills' 6; therefore, they were given overall scores of 2. Fellows received a cumulative score of only 2, and was given an overall score of 0; the remaining four units received overall scores of 1 (Table 7).

### 3.1.9 Final Scores - Critical Habitat Rating System

Scores assigned to the ten land units under the five rating system categories were summed (Table 8), and Buena Vista Valley received the highest score of 11 out of a possible maximum of 15. Elk Hills, NPR-1, would have received a final score of 14/15. Frazer Valley, Cuyama Valley, and Fellows had final scores of only 3 each and were tied for eighth (last) place as regards potential kit fox critical habitat. Four other land units had final scores above the median: Bitterwater Creek (9), Telephone Hills (8), Midway Valley (6), and Chico Martinez (5), Temblor Foothills and Kettleman Hills had below median scores of 4.

### 3.2 CHARACTERISTICS OF KIT FOX DENS

In addition to distribution and numbers of various types of kit fox dens that has been described, field data also provided useful descriptions of other den characteristics. Table 9 includes information on the average number of holes found in natal and multiple hole dens, as well as a synthesis of the

Table 8. Ratings of land units in the Bureau of Land Management, Bakersfield District, California, as potential San Joaquin kit fox critical habitat

Land Unit	Presence of Species	Breeding Sites	Prey Base	Space	Other Habitat Parameters	Total	Rank
Chico Martinez	1	1	0	1	2	5	5
Frazer Valley	0	0	1	0	2	3	8**
Buena Vista Valley	3	3	3	0	2	11	1
Telephone Hills	3	1	3	0	1	8	3
Midway Valley	3	0	3	0	2	6	4
Temblor Foothills	1	1	1	0	1	4	6*
Bitterwater Creek	3	3	1	0	2	9	2
Cuyama Valley	1	0	1	0	1	3	8**
Kettleman Hills	1	1	1	0	1	4	6*
Fellows	0	0	3	0	0	3	8**
Elk Hills <sup>1</sup>	3	3	3	3	2	14	

\*,\*\*Tied for these ranks

<sup>1</sup>Surveyed in 1979 using same field techniques provided here for comparison as an area known to support high populations of kit fox.

Table 9. Characteristics of San Joaquin kit fox dens observed in the BLM Bakersfield District, California, in 1979. Data are presented on the average number of holes and elevation.

Land Unit	Mean Number of Holes		Elevation (m)	
	Natal Den	Multiple-Hole Den	Minimum	Maximum
Chico Martinez	6.0	3.7	369	369
Frazer Valley		2.3		
Buena Vista Valley	6.3	3.7	203	431
Telephone Hills	2.0	9.0	477	708
Midway Valley	18.0	5.0	338	477
Temblor Foothills	3.5	4.6	523	707
Bitterwater Creek	6.7	3.7	162	469
Cuyama Valley		2.5	465	489
Kettleman Hills	6.7	4.6	277	338
Fellows				
Range	2-18	2-36	162	708
Mean	6.6	4.7	352	499

elevational range where dens were found. The number of holes has been a useful index to probable uses of dens, as kit fox tend to use larger dens for rearing their young and the smaller dens as daily shelter dens. When data from all land units were combined, natal dens had an average of 6.6 openings with a range of 2 to 18. Multiple-hole dens had fewer openings, average of 4.7, but a broader range of 2 to 36. Comparisons between land units are not justified because of the small sample sizes for most of them.

During our surveys dens were found at elevations between 162 and 708 m; most were found at an average elevation of about 400 m. The minimum elevation seemed limited only by the minimum elevations of the BLM parcels we surveyed. The lack of information on dens observed above 708 m probably demonstrates an upper limit on denning activities of the kit fox, since several BLM parcels had elevational ranges in excess of 800 m.

Regardless of overall elevation, kit fox dens appeared to be constructed in certain positions on the slopes of hills. The proportion of dens found at various positions was as follows: crest, 4%; upper slope, 15%; mid-slope, 29%; lower slope, 31%; wash (at the lowest point of a slope where it touches a wash), 14%; and on the flats, 7%. A high proportion, 81%, of the dens were found at or below mid-slope. Surprisingly few, 4%, of the dens were found on the crests of slopes, and only 7% were found in the broad flats.

The position on the slopes where kit fox dens were found was also related to their steepness, as indicated by data in Table 10. Over 90% of the dens were found on slopes of less than 40°, and half were found on slopes on 20° or less.



Table 10. Proportion of San Joaquin kit fox dens tabulated as a function of slope angle (°)

Slope Angle (°)	Dens Found (%)
0	9
5	9
10	12
15	9
20	11
25	11
30	18
35	8
40	6
45	1
50	3
>50	2

$\bar{x}$  slope angle = 22°

Another interesting finding was that entrances to dens did not appear to face random directions: 34% faced 0 to 80°, 32% faced 90 to 179°, 19% faced 180 to 269°, and 14% faced between 270 and 359°. Thus, 66% of the dens found were facing directions on the eastern half of the compass.

### 3.3 EFFECTIVE TRANSECT WIDTH

Distances measured between transect lines and dens observed in the BLM land units are summarized in Table 11. Over half of the dens were observed only when they were intersected by a transect, and 75% were found within 10 m of either side. If we combine information from all land units the average distance between transect lines and dens was 13.5 m.

The data on distances have not been analyzed using the Fourier series estimator of population density for line transect sampling (Anderson, et al, 1979; Burnham and Anderson, 1976; Crain, et al, 1978) because we were unable to meet the following conditions: maintain a straight and well-marked centerline, all measurements taken with a steel tape, and a transect length to insure that 60 to 80 dens were found within land units. For the purposes of this study we estimated an effective transect width of 27 m by doubling the average distance between transects and dens. This effective width suggests that in a section of land we found dens with an efficiency of 13%.

Information on the relative densities of kit fox dens (Table 4) and lagomorphs (Table 5) can be converted to an estimate of absolute densities per

Table 11. Proportion (%) of dens found at various distances (m) off the transects walked on BLM lands in the Bakersfield District, California, in 1979

Distance (m)	Chico Martinez	Frazer Valley	Buena Vista Valley	Telephone Hills	Midway Valley	Temblor Foothills	Bitterwater Creek	Cuyama Valley	Kettleman Hills	Total
0	42	76	32	73	59	50	41	86	61	54
5	50	12	8		18	12			10	11
10		12	11	13	12	18	6		7	10
15			8			3			2	2
20			8	7		6	12	14	3	5
25							18		3	2
30			8			3	6		3	3
40						3				1
45			3						2	<1
50	8			7			6		5	3
55			3							<1
60			5							1
70			3			3				1
75			3						3	1
80			3			3			2	1
90			3							<1
100					12		6			1
150			3				6			1

Overall  $\bar{x} \pm SE$   
Distance = 13.5  $\pm$  1.7



1000 acres by dividing the values by 0.13. Readers are cautioned against doing this without some recognition of the major assumptions and extensive variability associated with the extrapolation (Robinette, et al., 1974). We believe that the use of relative density information is preferred until the variance associated with the effective width can be estimated in areas with diverse terrain but having known densities of kit fox dens.

### 3.4 NIGHT SPOTLIGHT SURVEY

During the night spotlight survey conducted on 1 November 1979 in the Chico Martinez Land Unit to provide additional information on presence of kit fox, an 8.5-mile loop (Fig. 10) was driven from 19:07 to 20:45 hours for a total of 98 minutes of observations. The study area and survey route are plotted on the attached Carneros Rock topographic map. The air temperature was 9°C, skies were clear, and the moon was nearly full. A total of nine animals, other than cattle, was observed: four *Lepus californicus*, three owls, one possible canid, and one unidentified animal (Table 12). Amazingly, no small mammals were observed.

Portions of the area surveyed at night were considered to be marginal fox habitat owing to their relief; however, many other areas, especially the wide valleys and fields, were potentially important fox habitat, and yet no animals were observed. Results of the night survey support observations made during the daylight transect surveys that Chico Martinez supports only low to moderate numbers of kit fox.

### 3.5 VEGETATION

Due to the manner in which the vegetation survey was conducted, only broad generalizations were made about the plant associations observed in each land unit. The most extensive, predominant association observed consisted of swards of *Bromus rubens*, *Festuca* sp., and *Schismus arabicus* with a shrub cover of *Atriplex polycarpa*, *Atriplex spinifera*, and *Hymenoclea salsola*. Thus, they are consistent with Twisselman's (1967) description of Lower Sonoran Grasslands. Vegetation in other land units could be best described as Upper Sonoran Subshrub Associations, which are unique to the arid foothills of the southern San Joaquin Valley. They contain drought-resistant, summer dormant soft-wood shrubs, with an understory of annual plants similar to the Lower Sonoran Grassland and a few additional annual wildflowers.

The most apparent differences between land units as regards vegetation types were the presence and diversity of foothill-shrub species, and the species composition and abundance of weedy species. Table 13 is a matrix showing the presence of 26 of the most common species of plants observed in each land unit and its component sections.

Fellows, Kettleman Hills, and Midway Valley had comparatively few parcels in which foothill-shrubs were present. Hills in the Cuyama Valley and Bitterwater Creek Land Units had the most consistently diverse and complete representation of foothill-shrub associations. Hilly, high elevation parcels in the Temblor Foothills also had good representation of these species.

Species compositions and abundance of weedy species increased with the amount of disturbance within land units. Parcels in Fellows, Midway Valley, and

Fig. 10. Map of night-survey route

Table 12. Results of night spotlight survey for kit fox on BLM lands in the Chico Martinez Land Unit, California

Time	Milage	Species	Observations
1907	89.6		At gate
1915	90.4	Barn Owl	
1916	90.6	<i>Lepus californicus</i>	Near a cliff
1930	92.0		Stop at corral
1936	92.0		Begin again
1942	92.6		Possible owl, possible canid on hillside
2001	94.0		Mile check
2007	94.6		At gate in Section 2, stop
2010	94.6		Begin again
2013	94.8	<i>Lepus californicus</i>	
2015	95.0	<i>Lepus californicus</i>	Mile check, near arroyo
2017	95.3		Unidentified eye shine in flats
2025	96.0		Mile check
2038	97.7		Owl off side of road
2042	97.9		Possible <i>Lepus</i> off side of road
2045	98.1		End survey, temperature = 9°C

Buena Vista Valley had the greatest number of weedy species on them. The most commonly encountered weedy species was *Eremocarpus setigerus*, a frequent invader of valley grasslands and pastures.

Locations of San Joaquin kit fox dens were not associated with any specific type of vegetation association or species. Examination of information on den analysis sheets (Appendix B) showed that the vegetation types adjacent to fox dens were identical with the vegetation types being surveyed. There was no evidence that the fox were selecting specific den sites because of the presence, density, or growth form of the dominant plant species.

Table 13. Plant species observed along transects in sections assigned by Bureau of Land Management, Bakersfield District, for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat. Sections are arranged by land unit. Plant species are arranged into categories of "winter annuals," "perennial shrubs" (listed roughly by their distributional limits along a gradient of increasing elevation), and "weedy annuals."

Land Unit	Chico Martinez										Frazer Valley						
	Section	1	2	3	7	10	11	12	13	14	1	2	3	4	9	10	33
WINTER ANNUALS																	
<i>Bromus rubens</i>		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x
<i>Schismus arabicus</i>		x								x			x	x	x	x	
<i>Festuca</i> sp.		x	x	x		x	x	x	x	x			x	x	x		
<i>Plantago</i> sp.		x	x										x				
<i>Lepidium</i> sp.			x		x										x		
PERENNIAL SHRUBS																	
<i>Atriplex polycarpa</i>		x	x	x	x	x	x	x		x		x	x	x	x	x	x
<i>Hymenoclea salsola</i>																	
<i>Gutierrezia bracteata</i>		x		x		x	x	x	x	x					x	x	
<i>Isomeris arborea</i>				x		x								x	x	x	
<i>Haplopappus acradenius</i>				x		x	x		x				x		x	x	
<i>Atriplex spinifera</i>		x			x							x	x	x			x
<i>Eriogonum fasciculatum</i>		x	x	x	x	x	x	x	x	x			x		x		
<i>Ceratoides (Eurotia) lanata</i>			x	x		x	x	x	x				x				
<i>Eastwoodia elegans</i>			x	x	x	x		x	x					x	x	x	x
<i>Ephedra californica</i>																	
<i>Haplopappus linearifolius</i>																	
<i>Yucca whippleyi</i>																	
<i>Juniperus californicus</i>																	
WEEDY ANNUALS																	
<i>Salsola kali</i>																	x
<i>Eremocarpus setigerus</i>		x	x	x	x	x	x	x	x	x			x				x
<i>Centaurea melitensis</i>																	
<i>Ambrosia acanthicarpa</i>																	
<i>Helianthus annuus</i>																	
<i>Datura stramonium</i>																	
<i>Erodium cicutarium</i>																	

Table 13. Plant species observed along transects in sections assigned by Bureau of Land Management, Bakersfield District, for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat. Sections are arranged by land unit. Plant species are arranged into categories of "winter annuals," "perennial shrubs" (listed roughly by their distributional limits along a gradient of increasing elevation), and "weedy annuals." (Continued)

Land Unit	Buena Vista Valley												Telephone Hills					
	Section	2	2	4	6	10	12	20	22	24	26	32	4	7	8	9	29	30
WINTER ANNUALS																		
<i>Bromus rubens</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Schismus arabicus</i>		x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
<i>Festuca</i> sp.		x		x		x	x		x		x		x	x		x		
<i>Plantago</i> sp.		x						x										
<i>Lepidium</i> sp.		x		x			x									x	x	x
PERENNIAL SHRUBS																		
<i>Atriplex polycarpa</i>		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
<i>Hymenoclea salsola</i>		x	x					x		x								
<i>Gutierrezia bracteata</i>		x	x		x	x			x	x	x					x	x	
<i>Isomeris arborea</i>							x			x								
<i>Haplopappus acradenioides</i>											x				x			
<i>Atriplex spinifera</i>		x	x	x	x	x			x				x				x	x
<i>Eriogonum fasciculatum</i>					x											x		
<i>Ceratoides (Eurotia) lanata</i>		x		x	x	x		x					x			x	x	
<i>Eastwoodia elegans</i>		x		x									x			x		
<i>Ephedra californica</i>																		
<i>Haplopappus linearifolius</i>																		
<i>Yucca whippleyi</i>																		
<i>Juniperus californicus</i>																		
WEEDY ANNUALS																		
<i>Salsola kali</i>		x		x		x	x	x	x	x	x					x	x	x
<i>Eremocarpus setigerus</i>		x	x	x			x	x	x	x	x			x		x		
<i>Centaurea melitensis</i>			x															
<i>Ambrosia acanthioides</i>							x											
<i>Helianthus annuus</i>																		
<i>Datura stramonium</i>							x		x									
<i>Erodium cicutarium</i>							x	x		x	x	x					x	x

Table 13. Plant species observed along transects in sections assigned by Bureau of Land Management, Bakersfield District, for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat. Sections are arranged by land unit. Plant species are arranged into categories of "winter annuals," "perennial shrubs" (listed roughly by their distributional limits along a gradient of increasing elevation), and "weedy annuals." (Continued)

Land Unit	Midway Valley									Temblor Foothills										
	Section	4	5	9	10	24	27	32	35	2	7	18	18	20	20	28	33	34	35	
WINTER ANNUALS																				
<i>Bromus rubens</i>		x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	
<i>Schismus arabicus</i>		x		x	x	x	x	x		x		x	x	x	x	x	x	x	x	
<i>Festuca</i> sp.		x			x			x	x	x		x	x	x	x	x	x	x	x	
<i>Plantago</i> sp.		x														x				
<i>Lepidium</i> sp.					x				x										x	
PERENNIAL SHRUBS																				
<i>Atriplex polycarpa</i>		x	x	x	x	x	x	x	x		x	x	x				x	x	x	
<i>Hymenoclea salsola</i>						x											x		x	
<i>Gutierrezia bracteata</i>				x	x		x	x	x		x				x	x		x	x	
<i>Isomeris arborea</i>				x							x		x	x	x	x	x	x	x	
<i>Haplopappus acradenius</i>											x		x	x	x	x	x	x		
<i>Atriplex spinifera</i>					x		x	x						x						
<i>Eriogonum fasciculatum</i>							x		x		x			x		x	x	x		
<i>Ceratoides (Eurotia) lanata</i>							x		x				x	x		x	x	x		
<i>Eastwoodia elegans</i>							x				x		x			x	x	x		
<i>Ephedra californica</i>																			x	
<i>Haplopappus linearifolius</i>																			x	
<i>Yucca whippleyi</i>																				
<i>Juniperus californicus</i>																				
WEEDY ANNUALS																				
<i>Salsola kali</i>		x						x				x								
<i>Eremocarpus setigerus</i>		x		x	x	x	x	x	x		x	x		x			x		x	
<i>Centaurea melitensis</i>						x	x	x			x									
<i>Ambrosia acanthicarpa</i>						x														
<i>Helianthus annuus</i>																				
<i>Datura stramonium</i>																				
<i>Erodium cicutarium</i>											x			x	x	x		x		

Table 13. Plant species observed along transects in sections assigned by Bureau of Land Management, Bakersfield District, for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat. Sections are arranged by land unit. Plant species are arranged into categories of "winter annuals," "perennial shrubs" (listed roughly by their distributional limits along a gradient of increasing elevation), and "weedy annuals." (Continued)

Land Unit	Bitterwater Creek								Cuyama Valley												
	Section	3	4	9	10	15	32	33	3	4	6	8	9	13	14	15	18	31	32	32	35
WINTER ANNUALS																					
<i>Bromus rubens</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Schismus arabicus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Festuca</i> sp.		x	x	x	x			x	x								x	x	x		
<i>Plantago</i> sp.									x	x	x	x			x			x			x
<i>Lepidium</i> sp.				x											x						
PERENNIAL SHRUBS																					
<i>Atriplex polycarpa</i>		x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Hymenoclea salsola</i>									x	x			x							x	x
<i>Gutierrezia bracteata</i>			x					x	x	x				x	x	x	x	x	x	x	x
<i>Isomeris arborea</i>		x												x							
<i>Haplopappus acradenius</i>							x										x				x
<i>Atriplex spinifera</i>		x	x	x	x	x		x													
<i>Eriogonum fasciculatum</i>		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Ceratoides (Eurotia) lanata</i>		x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Eastwoodia elegans</i>			x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Ephedra californica</i>									x	x	x	x		x	x	x		x	x	x	x
<i>Haplopappus linearifolius</i>									x		x		x		x	x					x
<i>Yucca whippleyi</i>									x					x	x	x	x				x
<i>Juniperus californicus</i>									x					x	x				x		
WEEDY ANNUALS																					
<i>Salsola kali</i>							x														
<i>Eremocarpus setigerus</i>			x							x					x		x		x	x	
<i>Centaurea melitensis</i>																					
<i>Ambrosia acanthicarpa</i>																					
<i>Helianthus annuus</i>																					
<i>Datura stramonium</i>																					
<i>Erodium cicutarium</i>									x	x	x				x		x	x		x	x

Table 13. Plant species observed along transects in sections assigned by Bureau of Land Management, Bakersfield District, for field surveys in 1979 to determine their potential as San Joaquin kit fox critical habitat. Sections are arranged by land unit. Plant species are arranged into categories of "winter annuals," "perennial shrubs" (listed roughly by their distributional limits along a gradient of increasing elevation), and "weedy annuals." (Continued)

Land Unit	Kettleman Hills												Fellows					
	Section	4	6	8	10	12	18	20	24	28	30	34	21	22	23	25	27	35
WINTER ANNUALS																		
<i>Bromus rubens</i>		x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
<i>Schismus arabicus</i>							x		x		x	x			x			
<i>Festuca</i> sp.			x	x	x	x	x	x	x	x	x	x			x			x
<i>Plantago</i> sp.												x						
<i>Lepidium</i> sp.									x		x							
PERENNIAL SHRUBS																		
<i>Atriplex polycarpa</i>		x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
<i>Hymenoclea salsola</i>		x	x	x		x	x	x	x	x	x	x						
<i>Gutierrezia bracteata</i>				x		x	x	x		x	x			x	x		x	
<i>Isomeris arborea</i>														x		x	x	x
<i>Haplopappus acradenius</i>														x	x		x	
<i>Atriplex spinifera</i>																		
<i>Eriogonum fasciculatum</i>				x		x		x		x								
<i>Ceratoides (Eurotia) lanata</i>																		
<i>Eastwoodia elegans</i>						x	x											
<i>Ephedra californica</i>																		
<i>Haplopappus linearifolius</i>																		
<i>Yucca whippleyi</i>																		
<i>Juniperus californicus</i>																		
WEEDY ANNUALS																		
<i>Salsola kali</i>			x	x	x	x	x	x	x		x			x	x	x	x	
<i>Eremocarpus setigerus</i>		x	x	x	x	x	x		x		x	x		x				x
<i>Centaurea melitensis</i>														x	x	x		x
<i>Ambrosia acanthioides</i>																	x	
<i>Helianthus annuus</i>							x							x	x			
<i>Datura stramonium</i>															x		x	
<i>Erodium cicutarium</i>														x		x		



## 4. DISCUSSION

The major goal of this study was to determine whether any of the lands under jurisdiction of the BLM, Bakersfield District, should be considered for critical habitat status for the San Joaquin kit fox. The field surveys provided information to assess the potential of 32,000 acres in the southern and southwestern San Joaquin Valley. The recommendations in Section 5 are based on analysis of the field data, which in turn is based on what is presently known about the ecological life history and habitat requirements of the kit fox.

Any management plan to preserve the species cannot realistically hope to protect individual animals. The most effective program should focus on protecting large areas of optimal habitat - habitat which ideally should have a large established breeding population of foxes. With these requirements in mind, it is apparent that few of the BLM's land holdings in the Bakersfield District can satisfy the most rigorous definitions of critical habitat for this species.

The major problem with the surveyed lands was their small size and widely scattered distribution, factors which seem to reduce the possibility that the parcels could be effectively protected and managed for the kit fox. Wide-scale, sometimes severe disturbances, both on the lands themselves or on adjacent parcels, further decreases the potential of many BLM holdings as essential habitat. However, kit fox were obviously present, and in some cases breeding, in many of the sections surveyed. Until a more reliable population survey establishes the distribution and actual densities of kit fox in the southern San Joaquin Valley, all Federal lands with kit fox populations, even those with marginal numbers or habitat conditions, should be given special consideration as potential critical habitat areas.

The study results indicate critical habitat priority ratings, which will be addressed in the Recommendations section. This section discusses the findings which led to our recommendations that 1) protecting and managing the Buena Vista Valley, Chico, Martinez, and Bitterwater Creek Land Units as kit fox critical habitats should receive highest consideration; 2) secondary consideration should be given to establishing critical habitats for Midway Valley, Kettleman Hills, and Telephone Hills; and 3) low consideration can be given to Temblor Hills, and none to the Frazer Valley, Cuyama Valley, and Fellows Land Units.

### 4.1 HIGHEST PRIORITY CONSIDERATION

The Buena Vista Valley Land Unit scored highest (11/15) in the rating system, which supported our intuitive choice of the area as the most valuable kit fox habitat. Much of this valley consists of gently rolling foothill and valley floor terrain thought to be favored by the kit fox (Morrell, 1972). Light petroleum development and limited, light grazing by sheep are minimal. The land is far from agricultural development, which may secondarily protect the animals from poisoning and varmit hunting. High speed roads are also absent; the only access is gained by a long, dirt road that has a locked gate where it intersects

Naval Petroleum Reserve No. 1 (Elk Hills). Road kills have been reported as one of the most significant sources of kit fox mortality in the San Joaquin Valley (Morrell, 1972, 1975).

Perhaps the most important feature of the Buena Vista Valley is its proximity to the Naval Petroleum Reserve (NPR). Elk Hills not only supports one of the largest known populations of kit fox, but it is also being considered for critical habitat status. Considered separately, BLM parcels in Buena Vista Valley probably do not constitute a significant, protectable area warranting critical habitat status because they are relatively small and widely scattered. However, if NPR-1 is included as kit fox critical habitat, BLM lands would become more valuable as a buffer zone for NPR-1 and to increase the total valley floor acreage in the proposed critical habitat.

At present, petroleum development is moderate to light on parcels of BLM land in the valley, and the adjacent private lands are likewise lightly impacted. If petroleum reserves have been expended, the BLM and FWS may consider implementing conservation guidelines (Federal Register, Vol. 40, No. 78, April 22, 1975) that include federal acquisition of more lands in the Buena Vista Valley. The Elk Hills-Buena Vista Valley-Buena Vista Hills package is probably the last large area of the San Joaquin Valley that is still suitable for supporting a large, self-sustaining population of kit fox. Inclusions of as much of this area as possible into critical habitat may represent the most expedient, efficient way to save this species and its native habitat.

The Chico Martinez Land Unit rates highest consideration as potential kit fox critical habitat because of the area's large size and relatively undisturbed nature. Compared with all land units surveyed, the Chico Martinez drainage appears to be good fox habitat. Its relatively low score on our rating system was based on low densities of prey species and infrequent signs of fox use. Only one natal den was found, and results of the night spotlight survey supported daylight observations that Chico Martinez supports low to moderate numbers of kit fox.

The topography appeared ideal for kit fox and more evidence of their presence was expected. Populations may have been reduced by the impact of man and livestock. Because this area is used to pasture cattle, the State is trapping coyotes on Chico Martinez and surrounding ranch lands; a Twisselman Ranch employee told us that state trappers had been in the area recently. Before Chico Martinez is recommended to the FWS as potential critical habitat, the BLM should determine the extent and duration of the predator control program, its past impact on San Joaquin kit fox, and whether poisoned baits are being placed by federal, state, or ranch employees.

It has long been suspected that kit fox are killed as secondary targets of poisoning campaigns to reduce rodent populations in the San Joaquin Valley (Schitoskey, 1975; Swick, 1973; Morrell, 1975). Rodent control programs may also be partly responsible for the relatively low densities of lagomorphs and ground squirrels observed. Such campaigns, especially if conducted for several years, would certainly insidiously affect kit fox populations, through direct mortality and by reducing kit fox prey.

Grazing is the major disadvantage in recommending Chico Martinez as a critical habitat for kit fox. Published studies to determine the impact of grazing on native vegetation and herbivores in southern San Joaquin Valley are

unavailable. However, it would seem that chronic, heavy grazing of the California annual grasslands may have significant impact on the natural diversity and abundance of native species of animals.

The greatest densities of kit fox and their lagomorph prey were observed during the study of the Elk Hills Naval Petroleum Reserve, an area of moderate petroleum development that has been protected from grazing for several years. Kettleman Hills oil field is comparable to Elk Hills as regards overall oil development and general habitat features, but it has been grazed heavily up to the present. There was comparatively little evidence of kit fox over most of Kettleman Hills. The BLM's policy of allowing grazing of potential kit fox critical habitats, may require consideration of changes in frequency, type, or intensity of permissible grazing on these lands.

The Chico Martinez Land Unit may have supported larger kit fox populations in the past, but present land management practices appear detrimental to the species. Again the BLM might consider reducing grazing allotments and proscribe poisoning and trapping for this land unit. If there are compelling reasons for a kit fox reintroduction program, this land unit would be an ideal release point and study area.

The Bitterwater Creek Land Unit ranked second in the rating system and should be considered as potential San Joaquin kit fox critical habitat, although with lower priority than Buena Vista Valley and Chico Martinez. It contains a small breeding population of fox and appears to afford a small but continuous area of apparently good habitat on the alluvial plain west of Maricopa.

A major drawback is the highly travelled dirt road used by large tractor-trailer trucks enroute to a processing plant and surface mine adjacent to the land unit. The road bisects the alluvial plain at the base of the hills where kit fox den sites were found, and it serves as a barrier that must be crossed by animals moving into hunting territories in the flats. Traffic should be limited to daylight hours when fox are not usually active on the surface, and it would be better not to upgrade this to a paved, high-speed road.

If it is not feasible to designate this land unit as critical habitat for the kit fox, the BLM might consider a new management plan for the area. Future developments that would further erode the value of the habitat are not to be encouraged, and frequent monitoring of present activities could assess their impacts on the fox population.

#### 4.2 SECONDARY PRIORITY CONSIDERATION

Although ranked third in the rating system, the Telephone Hills Land Unit was grouped with the Kettleman Hills and Midway Valley Land Units for inclusion as kit fox critical habitat and should be considered second priority. The two northern parcels in Telephone Hills have been heavily disturbed by oil developments and Highway 33. Parcels to the south, especially those west of Derby Acres on the gentle hills at the head of Buena Vista Creek, and those including canyons north of Crocker Canyon, are good kit fox habitat that have breeding pairs present. These latter parcels rather than the more disturbed northern ones doubtless accounted for the high score of this land unit.

Regardless of its eventual status as critical habitat, the relatively undisturbed portions of this land unit (Sections 4, 5, 7, 9, and 32) must be managed to reduce human impacts on breeding kit fox and their natal dens. Section 9 also contains the only location where *Eriogonum gossypinum*, a plant of special interest, was found off Elk Hills.

Lower priority was recommended because the parcels which support kit fox populations are so small as well as proximate and vulnerable to the effects of cattle ranches, oil development, and the town of Derby Acres.

Midway Valley, ranked fourth in the rating system, offers the same kind of gently valley habitat as Buena Vista Valley. Although proximate to the totally disturbed Fellows habitat, Midway Valley was described separately because it appears to contain fairly good kit fox habitat.

A striking feature of the Midway Valley parcels, particularly north of Highway 33, is their apparent recovery as kit fox habitat following partial abandonment of petroleum field activity. Some washes still had polluted liquids flowing through them. Although no natal dens were found, there was much evidence of kit fox in some parcels, and lagomorphs were incredibly abundant (44.6/1000 acres). It is possible that this area is being used by foxes only as a hunting territory due to the high prey density.

Jackrabbit and cottontail populations may be artificially high because of access to a year-round water supply from leaking oil field water lines, associated dense second growth shrub cover, and to abundant green, weedy browse. This seems to indicate that oil development and management of kit fox prey are not mutually exclusive goals.

Future development of resources in Midway Valley, especially grazing, must be carefully monitored to minimize impact on the abundant kit fox food supplies in the area. Midway Valley would also serve as an excellent study area to examine the possible beneficial interactions between oil field activity, increased abundance of prey, and maintenance of kit fox populations. As this area recovers further from past oil field activity, it is also possible it will provide additional valuable valley floor habitat for the kit fox.

Because of conflicting considerations, assigning a priority to Kettleman Hills was probably the most difficult judgment had to be made. Total acreage was greater than any other land unit, but the parcels were scattered through a privately-owned oil field. If a cooperative habitat management plan could be developed with the oil company this would be a potentially valuable area; without such a plan the BLM would have a hopeless task of trying to protect a checkerboard of parcels.

Visually the Kettleman Hills appeared to offer good to excellent habitat, but we found surprisingly little evidence of kit fox. The one section (10, La Cima) where active natal dens were found is paralleled by a heavily travelled highway, has been severely impacted by off-road motorcycle activity and range fires, and has been overgrazed as well. This is another land unit to be re-examined as to grazing allotments, since many of the parcels appeared severely overgrazed. Some were stripped of vegetation to the mineral soil. It is also possible that poisoning and predator trapping programs are being conducted here to protect the sheep.

Kettleman Hills has been suggested for secondary consideration as critical habitat, primarily because there is no cooperative management agreement with the oil company controlling the remainder of the land. If it did, this land unit would merit a high priority along with Buena Vista Valley. Regardless of its ultimate ranking, this area merits some level of protection, especially from severe grazing damage, ORV impacts, and natal den disturbances. The Kettleman Hills in toto may also be a suitable release point for kit fox relocation projects.

#### 4.3 LOW PRIORITY CONSIDERATION

Although strikingly beautiful and relatively undisturbed, the Temblor Foothills are apparently too steep over most of its area to support kit fox. Evidence of them was infrequent or nonexistent in the upper elevations. The few breeding sites were observed in the gentler hills along the margins of the range, and fox using these natal dens were probably hunting in flats to the east. A large number of unidentified, single-hole dens were found in this land unit, dug by foraging badgers. Only low priority should be given to establishing these lands as critical habitat.

Frazer Valley should not be given serious consideration as kit fox critical habitat, since field surveys provided no evidence of their use by kit fox. The land unit is small, contains rugged to gentle topography, and has been moderately disturbed by grazing and oil developments, factors that put it last in our rating system.

Cuyama Valley tied with Frazer Valley for last place because little evidence of kit fox was observed. BLM parcels all lay on the steep scarp of the Caliente Range at the north side of Cuyama Valley. From its base the scarp rises very rapidly into a series of incredibly steep and rugged ridges and canyons where no evidence of kit fox was found. The few identifiable, non-natal, kit fox dens were found at the scarp base. Kit fox are present in the Cuyama Valley, but they are principally found in the broad, flatter habitats along the river.

Although the rugged terrain in this land unit cannot be recommended as kit fox critical habitat, it may be of special interest as a raptor nesting area. Many species of raptors were observed hunting in and around the river valley, and nests were frequently observed in the canyons of the BLM parcels.

Except for prey base, the Fellows Land Unit received the lowest possible rating. It is difficult to describe the complete destruction of native habitats in this area of intensive oil development. Vegetation has been bladed under in roads, pads, work yards, and buildings to the extent that we couldn't even consider the possibility of grazing activities on these parcels. Venting wells in this area are probably a major contributor to the degraded air quality, not only locally, but also in the southern San Joaquin Valley as a whole. Every wash that passes through this land unit winds up running with oily, briny, detergent-laden water from the wells, and these pollutants are eventually deposited to the southeast in an otherwise undisturbed habitat. These gummy, black washes are an obvious potential threat to all wildlife. Needless to say, there was little evidence that kit fox used the Fellows Land Unit, although lagomorphs were dense. This area deserves no consideration as potential kit fox critical habitat, because it cannot be considered as suitable habitat for anything except weedy plant species and perhaps rabbits.



Careless, unregulated development by small wildcat oil companies, most with little profit margin to devote to environmental safeguards, has produced a classic example of an ecological disaster area that is unpleasant to look at and unhealthy to work in. It is difficult to imagine that this land can ever be reclaimed once the petroleum is extracted. The BLM and the USGS, under their NEPA responsibilities, should insure that future oil field development does not follow the pattern established near Fellows, and enforce compliance with environmental laws on lands already impacted. Such careless development precludes the use of public lands for anything but petroleum extraction, and mocks the concept of multiple use.

#### 4.4 RATING SYSTEM DISCUSSION

The comparative rating system used to evaluate the potential of land units as kit fox critical habitat was so important to the recommendations that some discussion of the system itself is justified. The BLM and other readers can thus evaluate the technique, its reasonableness and limitations, and judge the relative rankings of the land units on their own. This exposition of the rating system will also stimulate constructive criticism of its application in other programs to evaluate potential critical habitats of animals.

In developing the rating system, habitat and life history criteria were chosen 1) which could be ideally quantified, 2) which effectively used the data gathered during this project, and 3) were consistent with the FWS guidelines for delineation of critical habitats.

Use of both quantitative and qualitative data in the rating system was necessary for this project. Quantification of all habitat and life history criteria, while theoretically desirable, was impossible because of incomplete knowledge of kit fox life history and habitat requirements. Some criteria, such as relative densities of dens, were more easily quantifiable, while others, such as the impacts of grazing, cannot presently be so described. In these latter cases qualitative judgements, based on staff experience and field information, were formed and numerically incorporated into the rating system.

Attempts to evaluate an area for its potential as kit fox critical habitat were difficult due to the lack of a definition of what constituted that habitat. The rating system was effective in incorporating important life history and habitat information, as presently known, and for evaluating each land unit in terms of these considerations on a comparative basis against each other, not against an undefined, nonexistent standard. To give perspective to final analysis of the rating system, it was compared with data collected from the Elk Hills Naval Petroleum Reserve, which appears to have an excellent population of kit fox and ideal habitat. NPR-1 served as a standard of excellence against which the other land units could be evaluated.

The rating system can be easily modified as new information and data are gathered, and it will readily accommodate additional categories. There were, however, potential biases inherent in the rating system due to the method in which it was devised. One possible source of bias was the grouping of individual BLM parcels into land units. Land units were defined in terms of location, topography, and other land use patterns and, as a result, the "other habitat parameters" category may have been affected. We were largely unable, however, to quantify such factors as topography, grazing, and oil field activities and,

therefore, grouped parcels with respect to these factors based on qualitative judgements based on our experience. It was necessary to group parcels with similar locations, topography, and land-use patterns so that a land unit could be treated as being more or less homogeneous as regards these factors. Homogeneity of a land unit with respect to physical features was the basis for evaluating large areas such as land units, rather than their individual parcels, for their potential as critical habitat based on the other rating categories.

Although the rating system could be used to judge individual parcels of potential critical habitat, it was most useful for evaluating larger areas of land. Grouping of individual parcels which were ecologically similar and in geographic proximity into land units seemed to be a more efficient and effective way to evaluate the lands because the amount of land surveyed was large and occurred in small, often disjunct, parcels scattered over a large area.

We also assumed we had considered all significant categories that are important in rating lands as kit fox critical habitat, and for which comparative data are available. Presence of the species is one very important consideration in the designation of critical habitat. Although absence of a species does not preclude designation of an area as critical habitat, evidence of a species' presence is a significant indicator that the animal can survive in that area.

Presence of breeding sites, an adequate prey base, and sufficient space to allow maintenance and breeding are factors that relate directly to the FWS guidelines for delineating critical habitat. Presence of breeding sites, as indicated by the density of active natal dens, demonstrated that the area is suitable for, and is being used by, at least one pair of breeding fox. Adequate prey base is certainly necessary to sustain a population of kit fox, and can also indicate areas having potential as hunting grounds. A large continuous areas is important because kit fox home ranges are between 640 and 1280 acres (Morrell, 1972), and they are not adaptable to habitat disturbances (Laughrin, 1970; Morrell, 1972, 1975). Large land areas may also be required if ranges are maintained as defended territories, a facet of animal behavior that has not been fully studied in the kit fox. However, Egoscue (1975) concluded that kit fox carrying capacity is primarily related to the animal's territorial requirements.

The "other habitat parameters" category included grazing, oil developments, and topography. Topography is a major physical feature of habitat which could limit the kit fox distribution. Oil development, another physical feature of habitat, was treated as a negative impact in proportion to its intensity. Oil developments, especially when intensive, can drastically alter the native habitat, and oil development of varying intensities was observed on the vast majority of areas surveyed. Grazing was also widespread and was treated as a negative habitat impact. It was a potentially important stress in areas where the grazing was intensive and had noticeably altered the vegetation in such areas.

Other factors not considered in the rating system include the presence of surface mines, soil types and depths, and potential accessibility by humans. Surface mines were generally scarce and few were operating. Two large mining operations were noted, both just outside BLM land holdings. Soil types and depths may be an essential factor in determining where kit fox can construct burrows. Some have speculated that the kit fox is a "poor digger" (Morrell, 1972) and may require loose structured or deep soils. Determining significant soil factors was beyond the scope of this study. Off-road vehicle activity may have an impact on kit fox populations (Laughrin, 1970), and the accessibility of the areas surveyed to this sort of activity was not determined.

Each category in the rating system required assumptions so that the available data could be used effectively. In the "presence of species" category we used dens as an indicator although no kit fox were actually seen; evidence of their presence in the forms of dens was easily recognizable. In this category, only observations of positively identified kit fox dens were used, as many dens were of questionable origin. Positive identification was possible when other kit fox sign - scats, tracks, gut piles, and parts of prey - was found associated with a den or in the immediate vicinity. We did not attempt to live-trap kit fox to confirm their presence on BLM lands. As reported, only one night survey, another standard technique to determine the presence of nocturnal species, was conducted in the Chico Martinez Land Unit.

Included in the "presence of species" category are figures for the number of inactive kit fox dens observed. Inactive dens were usually characterized by decayed or eroded entrances, entrances overgrown by vegetation, and old kit fox sign, especially in the form of eroded, white-colored scats. An inactive kit fox den indicates that the species was present at one time, and may still be, but the specific den was not used in 1979. Observations of inactive dens is the major reason Telephone Hills scored relatively high in this category.

The inclusion of inactive dens was also a factor in the overall rating of Fellows. The single, inactive den, combined with the small acreage of this land unit, resulted in a kit fox relative density that compared with Cuyama Valley, and gives the land unit a rating of 1 in "presence of species."

A total of six kit fox den types were used to indicate presence of species: active natal, multiple-hole, and single-hole dens; and inactive natal, multiple-hole, and single-hole dens. The value for each den type was weighted equally; thus, the presence of several active, multiple-hole dens had the same value as a comparable number of inactive, single-hole dens. This may have introduced a bias since the relative importance of various types of kit fox dens and their abundance is presently unknown. Furthermore, not all kit fox dens in an area were observed, and negative sightings of kit fox dens does not necessarily indicate that the species was absent from these lands. In the rating system under "presence of species," however, land units lacking kit fox den sightings received scores of zero.

Though signs of kit fox, such as scats, tracks, and prey remains, often indicate presence of the species in an area, these indicators were also noted when found away from a den site, and tallies of them are included in each land section summary in Appendix A. However, we were unable to quantify these data for use in the rating system.

Information on relative densities of active natal dens were also included in the "presence of species" category, because they are of course an excellent indication that the species was present. The fact that data on relative densities of active natal dens were used again to assess the "presence of breeding sites" was justified due to the importance of this den type to the species. In this way, active natal dens, the most important den type, were weighted more in the total rating score than other den types.

Under "presence of breeding sites," only the value for relative densities of active natal dens was used. Inactive natal dens indicate past use of the area as a breeding site, but information on their relative densities was not used to evaluate the breeding use of land units. The number of active natal dens used



by a pair of kit fox during a breeding season is uncertain. This could bias the scores received by some land units that support equal numbers of breeding pairs that are using unequal densities of natal dens.

Of course, not all of the dens in the area were observed, but the overall probabilities of seeing all types of dens within land units was certainly equivalent. Then too, evaluating the land units on a relative rather than absolute scale lessens the possible sources of bias in the assumptions used to rating categories.

The "prey base" category, although more easily quantified, was based on the assumption that *Lepus* and *Sylvilagus* constitute a major portion of kit fox diet. Dietary habits of the kit fox have not been fully determined. Kangaroo rats have been reported to be an important food item in California (Grinnell, et al., 1937; Hawbecker, 1943; Laughrin, 1970; Morrell, 1972), but in Utah jackrabbits and cottontails were the most abundant prey remains found at den sites (Egoscue, 1962). Prey remains found at den sites during our study indicate that lagomorphs constituted a major portion of prey returned to dens; therefore, relative densities of lagomorphs were used as one indicator of the available prey base for the kit fox. No censuses of small mammal densities were conducted; therefore, their important contribution to the diet of kit fox was not evaluated in this rating system.

Several factors may have influenced the number of *Lepus* and *Sylvilagus* tallied on each transect. Of course, not all lagomorphs were counted, and some may have been counted twice. Observations of *Lepus* and *Sylvilagus* were heavily dependent on the activity patterns of the animals and the extent to which season, weather, and time of day influence them. Observations of lagomorphs may have been affected by a visibility factor along different transects because the amount of cover in which the rabbits could hide varied considerably.

The majority of lands surveyed were disturbed in some manner, but the reaction of lagomorph populations to disturbances such as oil development and grazing are unknown. Experience gained during this study showed that even areas of heavy oil development supported relatively high densities of lagomorphs, but areas of heavy to moderate grazing supported only low densities.

The influence of the above factors on lagomorph observations was not weighted in our rating system. We assumed when the survey was conducted that the same probability of observing lagomorphs existed for all areas surveyed, regardless of the time of year or day, terrain conditions, and vegetation density. The rating system indicates those land units having larger prey bases compared with the other land units surveyed in a similar manner, but absolute information on what constitutes an adequate prey base for the kit fox is lacking.

The amount of protectable area available to the kit fox was important in rating the land units and, we used a home range estimate of 1-2 square miles (Morrell, 1972) to evaluate this factor. In rating a land unit for sufficient space the acreage of continuous parcels was summed to determine the largest contiguous, protectable area within each land unit. Parcels that were not in contact, or touched only at the corners, did not constitute a contiguous land area. We further assumed we had surveyed all BLM land holdings in each land unit, and that other federally controlled lands were not in the immediate area. The assumptions used to judge space availability will have to be re-evaluated if other protectable federal lands are contiguous with those surveyed in 1979.

Our emphasis on large contiguous areas for ranking of these land units as potential kit fox critical habitat does not mean that smaller, scattered parcels of federal land are expendable fox habitats. Presence of the species is the most concrete evidence that an area is suitable for kit fox, and den sites (particularly natal den sites) are unequivocal evidence for presence of the species. Any parcels of federal land that have kit fox den sites on them should be managed to conserve the species and its required habitat. Special emphasis should be placed on conserving natal den sites until more is known about their significance to survival of the species. Only activities compatible with the continued existence of kit fox and their critical habitat should be permitted on these parcels.

To complete comparisons of the land units with respect to their potential as kit fox critical habitat, the presence and effect of grazing, oil field development, and topography were noted.

Grazing by cattle and sheep, or indication of recent grazing activity, was observed on a majority of the lands surveyed. The only exception was Fellows, where intensive oil developments have removed the native vegetation to the extent that grazing would be virtually impossible. We assumed that grazing has a negative impact on the kit fox, and rated the land units as to how widespread and intensive grazing activity was in each. Grazing cattle and sheep may impact the fox directly or indirectly. Indirect impacts include competition between grazing animals and native herbivores for limited vegetation to the extent that rodent and lagomorph populations are reduced, which limit the kit fox prey base, and trampling of browse and soils sufficient to erode the quality of habitat for fox prey. Trampling might also negatively impact the fox directly by altering the soil hardness such that fox have difficulty digging burrows, or by triggering burrow cave-ins that trap and suffocate the fox underground.

The relationship between grazing pressure and herbivorous native mammal populations, and between these mammals and kit fox, is unknown. Data from this study indicate that land units rated as having heavy to moderate grazing generally had lower observed densities of lagomorphs.

As mentioned earlier, predator control trapping and poisoning campaigns associated with rangelands in California may constitute a serious, secondary impact of grazing on kit fox, but the extent is practically unknown and should be given serious consideration.

Oil development was also a common disturbance in many of the areas surveyed, except for Cuyama Valley. Oil field activity was most intense in the Fellows Land Unit. Oil development, as practiced on BLM lands, was assumed to have a negative impact on kit fox. Disturbances included paved and dirt roads with attendant traffic, grading for tank settings and well pads, increased noise and ground vibrations, especially during around-the-clock drilling, venting of poisonous gases, construction of setting ponds to hold waste water, often as open sumps, and release of some contaminated waste waters into washes. The cumulative effects of these activities on kit fox populations is unknown. It is difficult to conclude they are largely benign, judging by the extensive, long-term alterations of natural habitats that result.

Certainly extensive oil developments, such as on Fellows, are not compatible with maintenance of healthy kit fox populations. Conversely, the Buena Vista Valley, Bitterwater Creek, Telephone Hills, and Midway Valley Land Units have been

developed moderately and yet they ranked very high as potential kit fox critical habitats. This relationship is consistent with our findings on Elk Hills, where the excellent population of kit fox coexists with moderate oil field activities. Further studies must be conducted to determine the threshold at which intensity of oil field development begins to have both short- and long-term negative impact on kit fox populations.

Topographic features of surveyed areas were perhaps the most difficult to quantify. The assumption that topography plays a role in kit fox distribution is based on publications (Morrell, 1972) indicating that kit fox are absent from areas of steep slopes, and on results of this survey. The category was included to indicate land units in which topography may have been a major factor limiting kit fox distribution. Most parcels in both the Temblor Foothills and Cuyama Valley contained steep slopes and deeply dissected foothills. Why kit fox are absent from areas with steep terrain is unknown. One possibility, especially evident in Cuyama Valley, is that the shallow and unstable soils found on steep slopes are unsuitable for dens.

The type, quality, and depth of soils found in each land unit may be another important factor in determining an area's potential as kit fox habitat. Analysis of soils on the BLM land holdings was beyond the scope of this project.

All information gathered to describe kit fox dens was not used in the rating system; nevertheless, it provides noteworthy trends related to "choice" of denning sites that add greatly to our knowledge of the kit fox. Data indicated that on the average, kit fox natal dens had 40% more entrances than non-natal, multiple-hole dens. This seems to support the observations of Morrell (1972) that kit fox occupy dens with three or fewer entrances after the breeding season, and that natal dens are larger and have more entrances. The Elk Hills survey also indicated natal dens had more entrances than non-natal, multiple-hole dens.

The elevational range of BLM lands surveyed was between 138 and 1135 m, and yet no kit fox dens were found above 708 m and most were located at an average elevation of 400 m. These data suggest that 700 m may be the upper elevation limiting distribution of kit fox in the southern San Joaquin Valley. We are not implying that elevation per se is limiting, since kit fox have been found to 1860 m in Utah (McGrew, 1977). The limitation is probably imposed by changes in relief, soils, vegetation associations, and species composition and abundance of prey that become unfavorable with increasing elevation, in the southern San Joaquin Valley and exert a negative impact on kit fox.

A high proportion, 81%, of the dens were found at or below mid-slope. Surprisingly few, 4%, of the dens were found on the crests of slopes, and only 7% were found in the broad flats. The apparent preference may be due to the depth of soils and denseness of vegetation cover that appeared to increase on the lower slopes of washes. It is also possible that dens at lower levels were more easily detected by the field crew, and the data are an artifact of the sampling technique. However, in traversing the complex terrain the field crew had the same probability of seeing a den on a crest as on the lower slopes, particularly because so few dens were found off the transect line being walked.

The observation that most kit fox dens were absent on the higher, steeper portions of slopes was supported by data showing that half of the dens were found on slopes of 20° or less. Less than 10% were found on slopes greater than 40°.

Morrell (1972) likewise reported that dens on very steep slopes are rare, and most of his dens were found on slopes of 30° or less. While there may be some other reason or reasons limiting kit fox den locations to lower slopes of less than 40°, a very real consideration is the physical difficulty of trying to walk, run, or dig, even with four legs, on slopes.

A puzzling observation was that 66% of the dens faced the eastern half of the compass, even though many parcels of land surveyed offered a full range of slope facings for den construction. We can't even speculate on why this preference might be advantageous for survival of the species. Further analyses of these data, as well as comparable measurements made on Elk Hills, must be performed to see if the pattern is constant.

Since there was no evidence indicating that kit fox were selecting den sites because of the presence of particular plant species or associations, we were unable to include a vegetation category in our rating system. If there are subtle correlations between kit fox den sites and aspects of plant ecology, the chosen survey methods were not sensitive enough to detect them. The only finding, that kit fox dens are located in the major vegetation associations below 700 m in the southern San Joaquin Valley, is so general that it has limited value for predicting environmental constraints or critical habitat requirements.

Evidence of the blunt-nosed leopard lizard was sparse: one adult was noted in Section 6, T31S, R23E, West Elk Hills Quadrangle, and one hatchling was found in Section 2, T29S, R20E, Carneros Rocks Quadrangle. However, lack of observations was not surprising since activity of the lizards is known to be low during the time of year this survey was conducted.

During the course of the study, areas of special biological interest that might warrant protective and management considerations by the BLM were noted. Although not directly related to the San Joaquin kit fox, information on these areas is included here for use by the bureau.

In Sections 3 and 4, T30S, R21E, Reward Quadrangle, we found a wash running approximately northeast that was at least 10-m deep in some places and had nearly vertical walls. Along a short (approximately 1/2 mile) portion of the wash 12 barn owls and perhaps a thousand owl castings were observed. Two golden eagles and a coyote were seen in the area, and on a subsequent trip an unidentified buteo and falcon were seen. The area is ideal for studying the dietary habits and nesting and social behavior of barn owls.

The only population of the cottony buckwheat, *Eriogonum gossypinum*, was found in Section 9, T31S, R22E, Fellows Quadrangle. This was the only location this species was found off Elk Hills where it is more common on specific habitats. It has been listed as "rare" by the California Native Plant Society, and at one time it was on a list of potential candidate "threatened" species published by the Department of Interior. The status of this plant is presently under review.

The Cuyama River Valley and the Caliente Range escarpment to the north had the most abundant and diverse population of raptors of all the BLM lands surveyed. Six species of hawks and falcons and one species of owl were noted in the area. Other species were seen but they were not included in the tally because they were observed outside the BLM land holdings.

There are several springs located in the escarpment of the Caliente Range that provide unique pockets of mesic, almost riparian, habitat in these otherwise harsh, xeric foothills. Western toads, *Bufo boreas*, were found at one spring, and at another we observed pacific tree frogs, *Hyla regilla*, and a California vole, *Microtus californicus*. These springs are potentially important habitats for isolated populations of species requiring mesic conditions. They also serve as a free-water source for other species. They are threatened by the presence of cattle that trample and eat the vegetation and disturb the adjacent soils.

Some other parcels of BLM land contained relicts of the original perennial grasslands that may have dominated the Central Valley before intensive grazing and agriculture were introduced by the Spaniards. None of the stands were very large, but they do provide a reservoir for the scarce, native species that have been extirpated over most of the region. Information on the types and locations of these relicts is found in field notes of this survey.

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## 5. RECOMMENDATIONS

1. The Bureau of Land Management should give high priority to recommending San Joaquin kit fox critical habitat status for lands under their jurisdiction in the Buena Vista Valley, Chico Martinez, and Bitterwater Creek Land Units. Until the Secretary of Interior accepts their recommendations, the Bureau should manage these lands to insure that other uses do not negatively impact this endangered species.

Second priority should be given to establishing critical habitat status for BLM lands in the Midway Valley, Telephone Hills, and Kettleman Hills Land Units. If a cooperative agreement to protect and manage the kit fox on the Kettleman Hills can be formulated with Standard Oil of California, the BLM should upgrade the priority of this land unit.

Minimal consideration should be given to designating BLM lands in the Temblor Foothills Land Unit as critical habitat.

There is no apparent justification for recommending critical habitat status for BLM lands in the Frazer Valley, Cuyama Valley, and Fellows Land Units.

2. In the spring of 1981 the BLM should sponsor more extensive surveys of the status of kit fox habitats on the Chico Martinez and Kettleman Hills Land Units. Because of their size alone, these units could prove to be the most valuable for management of kit fox; however, further information on the presence of the species is necessary. A field program should include 1) night surveys of selected roads; 2) live-trapping, tagging, and release of animals; 3) additional transect surveys to appraise density of lagomorphs in the spring; 4) live-trapping and release of small mammals to evaluate the relative density of kangaroo rats and other preferred nocturnal mammals; and 5) aerial surveys and photography to locate active natal dens during the pupping season.

3. The potential of BLM lands in other districts as kit fox critical habitat should be evaluated in the spring of 1981. Surveys should be conducted using comparable field techniques, preferably by the same trained field crew used in 1979. In addition to providing information on the status of BLM lands as regards critical habitat for kit fox, further field data can also be used to test the usefulness of the rating system described in this report.

4. The transect technique chosen by the BLM to survey their lands for kit fox dens and presence of the blunt-nosed leopard lizard should be calibrated to determine the effective width of the transects and the relative efficiencies of different observers. Areas with known densities of kit fox dens and a range of terrain features should be chosen and surveyed using the prescribed method. Resulting data can then be compared with actual distributions and numbers of dens to estimate effective width of the transect, relative efficiencies of several observers, and the influence of terrain on observations.

The BLM should also consider use of aerial photographs to determine presence and distribution of kit fox dens on their land holdings. Photos taken over Elk Hills showed that active natal dens could be resolved. Good photo coverage offers a possible alternative technique to the expensive, labor-intensive field surveys already contracted.

5. Oil field developments are one of the most extensive, serious impacts on BLM lands in the southern San Joaquin Valley. We know of no information to evaluate the possible impacts, both positive and negative, of various levels of petroleum development on the kit fox and its critical habitat. Since the BLM has to make management decisions about whether to allow new oil developments in this area, it should first gather sufficient information to determine compatible activities. The Bureau should actively support projects designed to gather this information in a timely way. Studies should be undertaken to determine oil field activities that are compatible with kit fox critical habitats, the threshold at which intensity of oil field activities begin to exert a negative influence on habitats, and methods to quantify levels of development, i.e., what are the measurable differences between areas of light, moderate, or heavy development?

Since some oil activities on BLM lands have caused serious impacts, the Bureau and USGS should re-examine their compliance guidelines and enforcement activities to insure that NEPA is not circumvented.

6. Grazing impacts kit fox and their critical habitats in ways that are not fully understood, and yet allotments are renewed each year without considering their compatibility with critical habitats. The Bureau should support field studies to determine the effects of cattle and sheep grazing of varying intensities on both the short- and long-term success of kit fox populations. Such studies are especially needed on the Chico Martinez and Kettleman Hills Land Units where past grazing practices may be partly responsible for the low densities of kit fox observed.

7. Oil developments have been abandoned on some BLM lands and yet the damage caused by past activities is still visible. The Bureau should examine the state-of-the-art as regards reclamation and revegetation practices in semi-arid habitats, and apply practical programs to enhance natural recovery of disturbed BLM land holdings. Ideally, such reclamation should be paid for by the lease holder, but the BLM should be ready to provide advice on how to carry out such practices. We further suggest that new leases should contain a reclamation requirement and suitable performance bond to insure that after petroleum products are extracted, lands returned to the public domain are returned to a useful condition.

8. Predator trapping and poisoning campaigns are not compatible with potential kit fox critical habitats. Before recommending any land units for critical habitat status the BLM should review these practices on priority lands and proscribe them in the future. Efforts should also be made to determine the impacts of trapping and poisoning campaigns on kit fox, lagomorph, and rodent populations on BLM lands.



9. The Bureau is encouraged to develop a cooperative kit fox management plan with Standard Oil of California on the Kettleman Hills. These depleted oil fields might then serve a contemporary mission of providing a large, suitable habitat for kit fox.

10. Soil is one environmental parameter that appears to exert a strong influence on the distribution and numbers of kit fox dens. These dens are often dug to depths of at least 1 m in loose-textured soils (Morrell, 1972). The type of soil; its structure, stone, and rock content; and the depth to impenetrable bedrock or caliche are probably important in determining areas where a fox could potentially dig a den. A survey to examine the possible relationships between density of kit fox dens and soil characteristics would be helpful in defining critical habitat requirements of the species.

11. Relatively little is known about kit fox food habits, yet it has been speculated that human activities, such as grazing, agriculture, oil fields, negatively impact kit fox by reducing the species composition and availability of preferred prey. To evaluate possible impacts of this kind the BLM should support studies of the seasonal, breeding, and regional prey base of the kit fox. Such studies should be carefully designed to assess the types and quantities of prey available to determine whether the species is in fact an opportunistic feeder.

12. The BLM should consider designating the Cuyama Valley springs and raptor nesting areas, and owl canyon in the Fellows Land Unit, as "areas of special scientific concern." Further developments in these areas should not impact the sites, and efforts should be made to protect portions of the springs from chronic grazing pressure.

13. If there are compelling reasons to engage in a kit fox transplant program from areas where agricultural developments are contemplated, the Chico Martinez and Kettleman Hills Land Units would make suitable release points. Such projects are not encouraged, however, because their biological success is doubtful in most instances, and no rigorous attempts to evaluate impacts of such activities are available. Certainly transplants should not be approved unless 1) there is a preliminary survey to determine presence, distribution, den usage patterns, and success of the resident kit fox in the reception area before a release takes place; 2) released animals are equipped with radio collars and monitored to determine their movements and survival; 3) several resident kit fox in the reception area are similarly equipped with radio collars to determine whether they are displaced by released animals; and 4) sufficient data are collected to determine whether the transplant resulted in a net increase to the kit fox population in the release area. A transplant can only be judged successful if the released animals live, no residents are displaced by the transplants, and the population increases.

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# APPENDIX A: DATA SUMMARY SHEETS FOR INDIVIDUAL PARCELS OF BLM LANDS SURVEYED FOR THEIR POTENTIAL AS SAN JOAQUIN KIT FOX CRITICAL HABITAT

At the end of each survey, data gathered by the field crew was collated and then synthesized to provide a concise summary of all important information gathered for each individual land parcel. Because data from individual parcels might be overlooked or lost when combined with data from other parcels into land unit summaries, they are provided here. The information on individual parcels is arranged by land unit.

Data for each parcel have been arranged into the following categories: location, topography, habitat, prey base, evidence of kit fox, conclusions, and recommendations.

Location. The township, range, and section coordinates are provided along with the title of the topographic map used. Areal extent to be surveyed is also included. The date surveyed and names of field crew allow cross referencing with field data books.

Topography. Descriptions of drainage patterns, relief, and other topographic features that might affect kit fox are provided.

Habitat. Information on vegetation associations, species of flora observed, and general soil types were included in this category. Significant human disturbances were also described here.

Prey Base. The numbers of black-tailed jackrabbits and Audubon's cotton-tails observed were tallied in this category to provide an index to prey base.

Evidence of Kit Fox. The total number of each type of den observed by the field crew is given. Den types included: active natal, AN; inactive natal, IN; active multiple-hole, AM; inactive multiple-hole, IM; active single hole, AS; and inactive single hole, IS. The category also provides a summary of the numbers of kit fox tracks, scats, and prey remains observed in the land parcel.

Conclusion. A preliminary evaluation of the significance of this land parcel as kit fox critical habitat is given, and important observations that did not apply to above categories are included.

Recommendation. There are steps that should be taken to 1) maintain good habitat, 2) stop further deterioration of habitat, or 3) reverse present policies to improve habitat.



TOWNSHIP RANGE: T29S, R20E

QUADRANGLE: Carneros Rocks

SECTION NO(s): 1 and 12

LAND UNIT: 1

ACREAGE: 768

DATE OF FIELD  
SURVEY:

29 October 1979

FIELD CREW:

Kato, McCue, Sauls

TOPOGRAPHY:

Flat in the northern half of Section 1, becoming hilly in the southern half of Section 1 and in Section 12.

HABITAT:

Gentle valleys, with grazing: *Bromus rubens*, *Festuca* sp.  
Shrubs more common on slopes: *Atriplex polycarpa*, *Atriplex spinifera* (especially on old surface mines), *Eastwoodia elegans*, *Eriogonum fasciculatum*.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION:

Good potential kit fox habitat. Minimal disturbances with grazing being the most widespread, and oil development confined to a small area in the northern quarter of Section 1. Few small mammals including lagomorphs were seen.

RECOMMENDATION:

The area should be surveyed in the spring, and further activity monitored.





TOWNSHIP RANGE: T20S, R20E

QUADRANGLE: Carneros Rocks

SECTION NO(s): 1 and 2

LAND UNIT: 1

ACREAGE: 768

DATE OF FIELD  
SURVEY:

29 October 1979

FIELD CREW:

Kato, McCue, Sauls

TOPOGRAPHY:

Flat in the northern 1/2 of Section 1, becoming hilly in the southern 1/2 of Section 1 and in Section 12.

HABITAT:

Gentle valleys — graded: *Bromus rubens* and *Festuca* sp.  
Shrubs more common on slopes: *Atriplex polycarpa*, *Atriplex spinifera* (especially on old strip mines) with *Eriogonum fasciculatum*.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

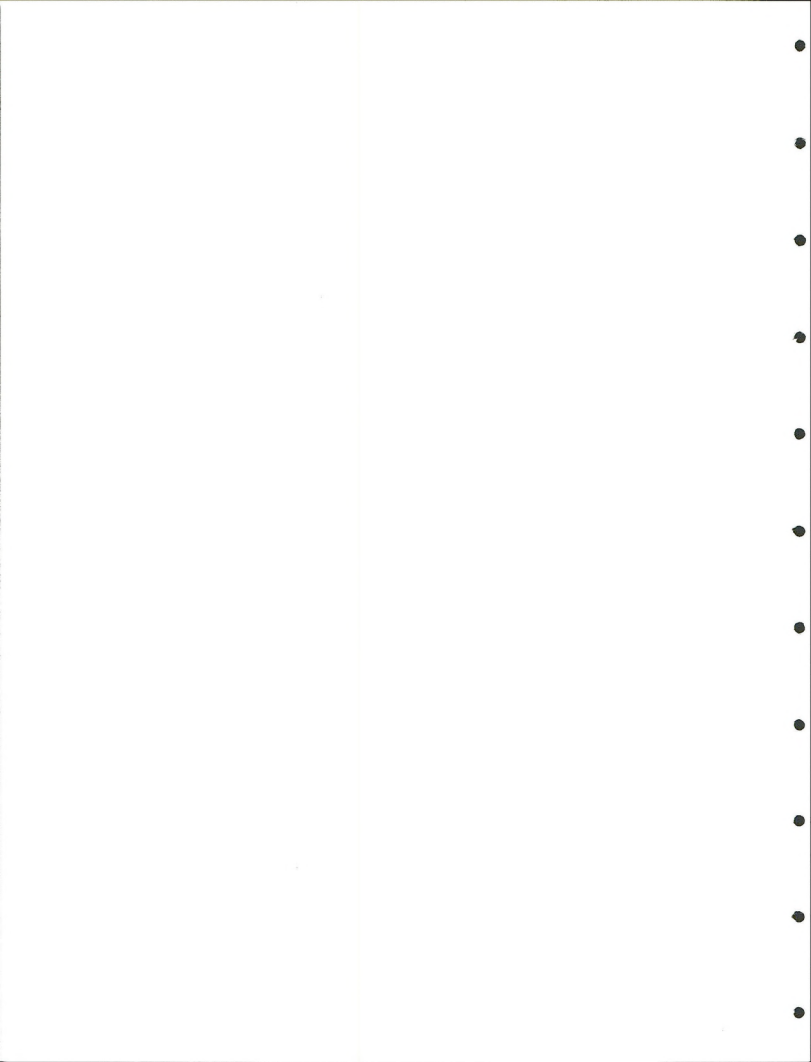
	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION:

Good potential kit fox habitat. Minimal disturbances with grading being the most widespread, and oil development confined to a small area in the northern 1/4 of Section 1. Few small mammals including lagomorphs were seen.

RECOMMENDATION:

The area should be resurveyed in the spring, and further activity monitored.



TOWNSHIP RANGE: R29S, R20E

QUADRANGLE: Carneros Rocks

SECTION NO(s): 14 LAND UNIT: 1 ACREAGE: 160

DATE OF FIELD  
SURVEY: 30 October 1979

FIELD CREW: McCue

TOPOGRAPHY: West to east flowing washes traverse this section in 3 places.  
Ridges moderately steep.

HABITAT: *Bromus rubens* understory; *Eriogonum fasciculatum* cover on  
ridges; *Atriplex polycarpa* in flats.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Potentially good kit fox habitat. Minimal disturbances with grazing being the most widespread. Few small mammals including lagomorphs were seen.

RECOMMENDATION: The area should be monitored and resurveyed in the spring.



TOWNSHIP RANGE: R29S, R20E

QUADRANGLE: Carneros Rocks

SECTION NO(s): 3 and 10

LAND UNIT: 1

ACREAGE: 520

DATE OF FIELD  
SURVEY:

30 October 1979 and 31 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY:

Northern half — rolling hills and ridges  
Central — Chico Martinez Creek Valley  
Southwest — Steep ridges

HABITAT:

Mostly grassland: *Bromus*, *Festuca*, *Eriogonum fasciculatum*.  
On ridges: *Eastwoodia*, *Gutierrezia*, *Haplopappus*, *Isomeris*.  
Major disturbance: grazing

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	4
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	2		
Inactive single (IS)	3		

CONCLUSION: Potential kit fox habitat.

RECOMMENDATION: Section should be resurveyed for more natal dens at a later date. Small mammal densities should be studied if the area is to be considered as critical habitat. Development should be kept to a minimum.



TOWNSHIP RANGE: R29S, R20E

QUADRANGLE: Carneros Rocks

SECTION NO(s): 13 LAND UNIT: 1 ACREAGE: 320

DATE OF FIELD  
SURVEY: 30 October 1979

FIELD CREW: Kato, Sauls

TOPOGRAPHY: Mostly flats, sloping gently to the east, cut by 3 creeks, one with standing water.

HABITAT: Mostly grassland: thick *Bromus*, *Festuca*; slight to moderate grazing; old strip mine present on west edge. Slopes to the west, south: *Eriogonum fasciculatum*, *Atriplex polycarpa*, *Eurotia*, *Isomeris*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Good potential kit fox habitat.

RECOMMENDATION: Future development and all grazing should be monitored. Recommend small mammal study and possibly a grazing study.





TOWNSHIP RANGE: R29S, R21E

QUADRANGLE: Carneros Rocks

SECTION NO(s): 7 LAND UNIT: 1 ACREAGE: 160

DATE OF FIELD  
SURVEY: 31 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Mostly flat in the northeast portions, a ridge in the southwest.

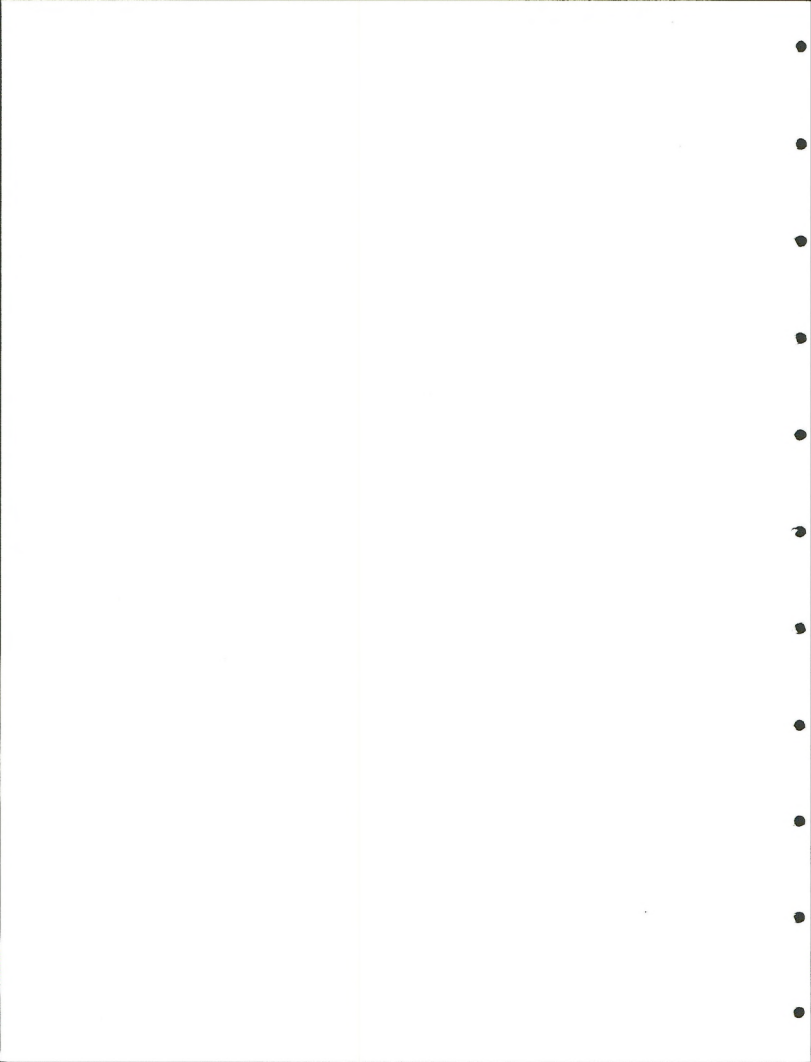
HABITAT: Flats: *Bromus*, *Festuca*, *Atriplex polycarpa*. Ridges: *Eriogonum fasciculatum*, *Eastwoodia*. Light grazing disturbance; oil wells nearby.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Good potential kit fox habitat.

RECOMMENDATION: Oil development and grazing should be monitored.



TOWNSHIP RANGE: R29S, R20E

QUADRANGLE: Carneros Rocks

SECTION NO(s): 2 and 11

LAND UNIT: 1

ACREAGE: 768

DATE OF FIELD

SURVEY: 29 October 1979 and 30 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Rolling hills, some flats, steep to the south.

HABITAT: Flatter areas in south: *Bromus rubens*, *Festuca* sp., and *Eriogonum fasciculatum*. Shrubs: *Atriplex polycarpa*, *Haplopappus*. Steep ridges: *E. fasciculatum*, *Eastwoodia*, *Gutierrezia*, *Isomeris*. Grazing is major disturbance.

PREY BASE:

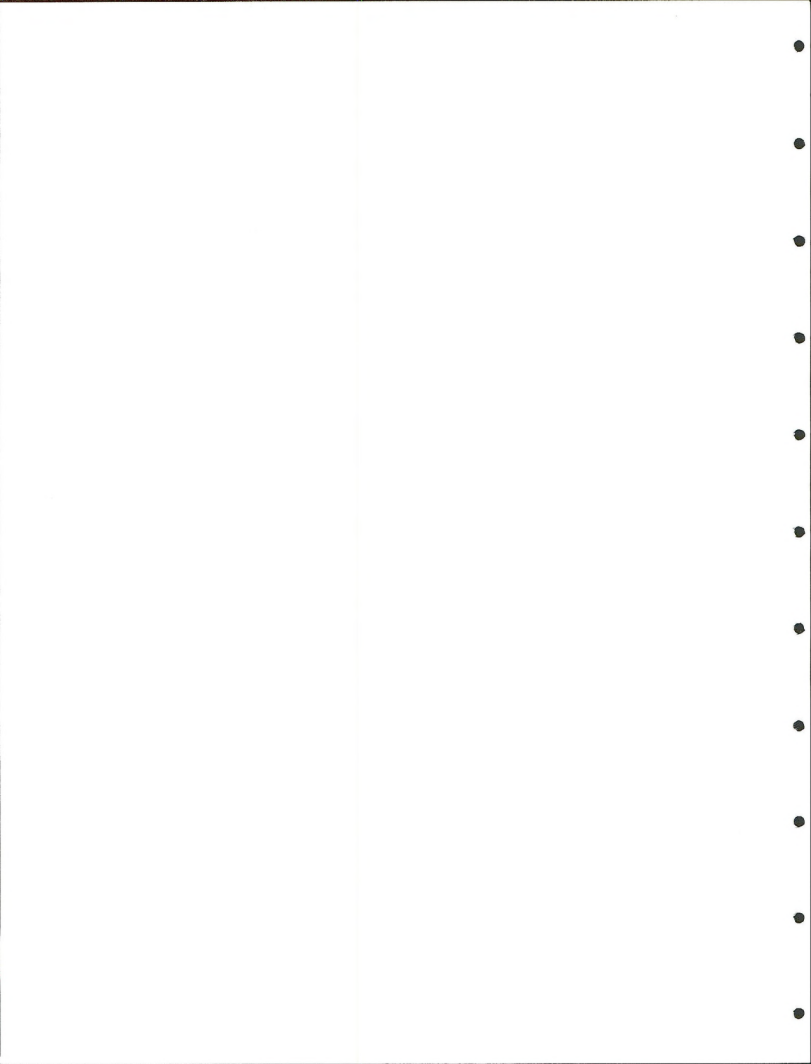
	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION: Potential kit fox habitat.

RECOMMENDATION: Small mammal densities should be studied. Development should be kept to a minimum and monitored. Grazing studies (relationship to lagomorphs and rodent should also be done).



TOWNSHIP RANGE: R30S, R21E

QUADRANGLE: Reward

SECTION NO(s): 1 and 2

LAND UNIT: 2

ACREAGE: 420

DATE OF FIELD  
SURVEY:

7 November 1979

FIELD CREW:

Kato, McCue

TOPOGRAPHY:

Very flat; the western 1/4 is bisected by Highway 33.

HABITAT:

*Bromus/Schismus* understory with *Atriplex spinifera* cover.

PREY BASE:

Total

*Lepus*

9

*Sylvilagus*

1

EVIDENCE OF  
KIT FOX:

Total

Total

Active natal (AN)

0

Scats

4

Inactive natal (IN)

0

Tracks

0

Active multiple (AM)

1

Prey remains

0

Inactive multiple (IM)

0

Active single (AS)

2

Inactive single (IS)

3

CONCLUSION:

Potentially good kit fox habitat. Minimal disturbances with only a few oil wells in the vicinity.

RECOMMENDATION: The area should be monitored concerning future activity.





TOWNSHIP RANGE: R30S, R21E

QUADRANGLE: Reward

SECTION NO(s): 3 and 4

LAND UNIT: 2

ACREAGE: 624

DATE OF FIELD  
SURVEY:

6 November 1979

FIELD CREW:

Kato, McCue

TOPOGRAPHY:

Extremely rugged in the southwest and southeast; drainages generally flow northeast into the flats.

HABITAT:

*Bromus rubens* understory; cover of *Atriplex polycarpa*,  
*Eastwoodia*.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	2		
Inactive single (IS)	2		

CONCLUSION:

Potentially good kit fox habitat in areas where the terrain is not extremely rugged. Little disturbance in this area, but there is a large mining operation nearby. In a deep wash in the northern part of these sections flowing northeast, there is a very high population density of barn owls. Other raptors were also noted nearby.

RECOMMENDATION:

Further mining activities should be monitored. The area should be monitored carefully so that owls, other raptors, and small mammals can be further studied.



TOWNSHIP RANGE: R29S, R21E

QUADRANGLE: Reward

SECTION NO(s): 33 LAND UNIT: 2 ACREAGE: 120

DATE OF FIELD  
SURVEY: 6 November 1979

FIELD CREW: Kato, McCue

TOPOGRAPHY: Gentle, west-to-east washes and ridges, becoming flat to the northeast.

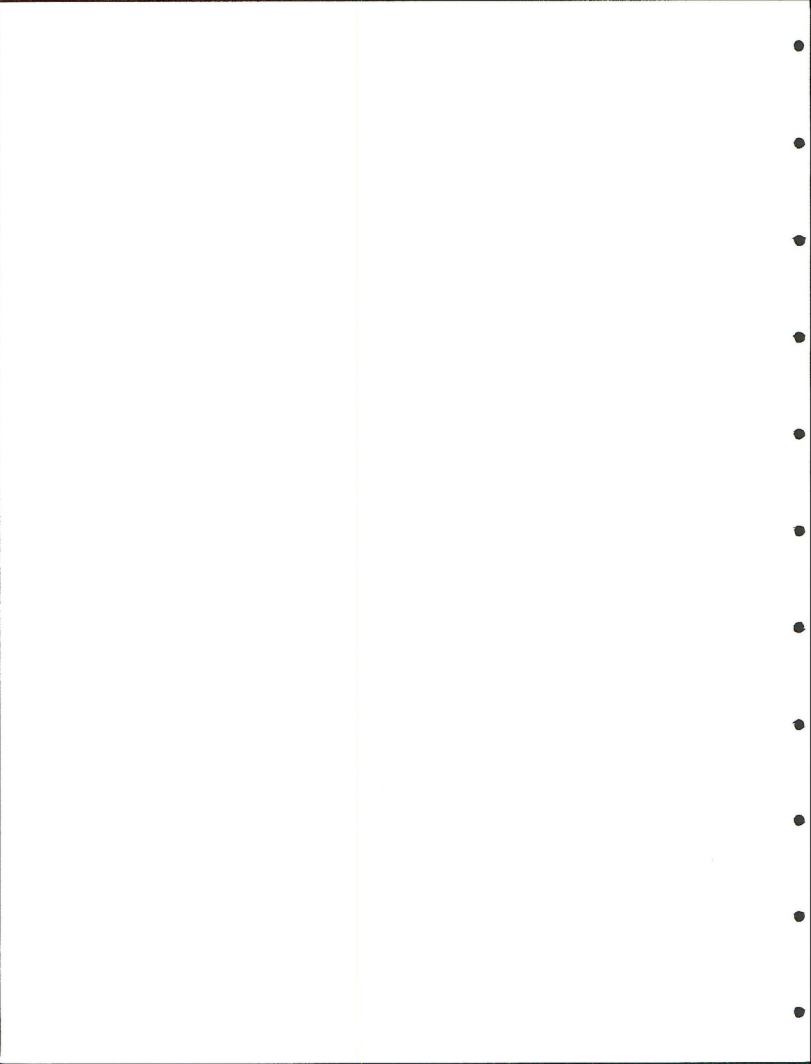
HABITAT: Cover -- *Atriplex spinifera*  
Understory -- *Bromus rubens*  
Grazing is moderate to heavy

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Potential kit fox habitat.

RECOMMENDATION: Development should be kept to a minimum and monitored.



TOWNSHIP RANGE: R30S, R21E

QUADRANGLE: Reward

SECTION NO(s): 9 and 10

LAND UNIT: 2

ACREAGE: 704

DATE OF FIELD  
SURVEY:

5 November 1979

FIELD CREW: Kato, McCue

TOPOGRAPHY: Large plateau in the southwest. Drainages run northwest and northeast.

HABITAT: *Bromus/Schismus* grassland. *Isomeris*, *Eastwoodia*, and *Atriplex polycarpa* limited primarily to washes. Grazing is moderate.

PREY BASE:

Total

*Lepus*  
*Sylvilagus*

3  
0

EVIDENCE OF  
KIT FOX:

Total

Total

Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	4		
Inactive single (IS)	2		

CONCLUSION: Potential kit fox habitat.

RECOMMENDATION: Development should be kept to a minimum and monitored.



TOWNSHIP RANGE: NE 1/8 and SW

QUADRANGLE: West Elk Hills

SECTION NO(s): 6 LAND UNIT: 3 ACREAGE: 480

DATE OF FIELD SURVEY: 10 September 1979 (NE) and 12 September 1979 (SW)

FIELD CREW: Cherniss, Dawson, Kato, Sauls

TOPOGRAPHY: Two series of SE running ridges, much relief, with a large central alluvial fan.

HABITAT: Central valley: *Bromus*, *Schismus*, *Lepidium*, *Plantago*. Ridges with *Atriplex polycarpa*, *Atriplex spinifera*, with other occasional shrubs. Ridges have sparse cover.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	7
<i>Sylvilagus</i>	12

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	1	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	2		
Active single (AS)	7		
Inactive single (IS)	2		

CONCLUSION: Good kit fox habitat; fox present in this largely undisturbed section. Buena Vista Creek as it flows through the section is very polluted from Midway Lease activity, which poses a potential threat to wildlife. One *Crotaphytus silus*, (blunt-nosed leopard lizard) seen.

RECOMMENDATION: Future development should be monitored and approved.





TOWNSHIP RANGE: R31S, R22E

QUADRANGLE: Fellows, West Elk Hills

SECTION NO(s): 12 LAND UNIT: 3 ACREAGE: 160

DATE OF FIELD  
SURVEY: 19 September 1979

FIELD CREW: Dawson, McCue

TOPOGRAPHY: Mostly flat, hills in the east, 2 creeks running west to east.

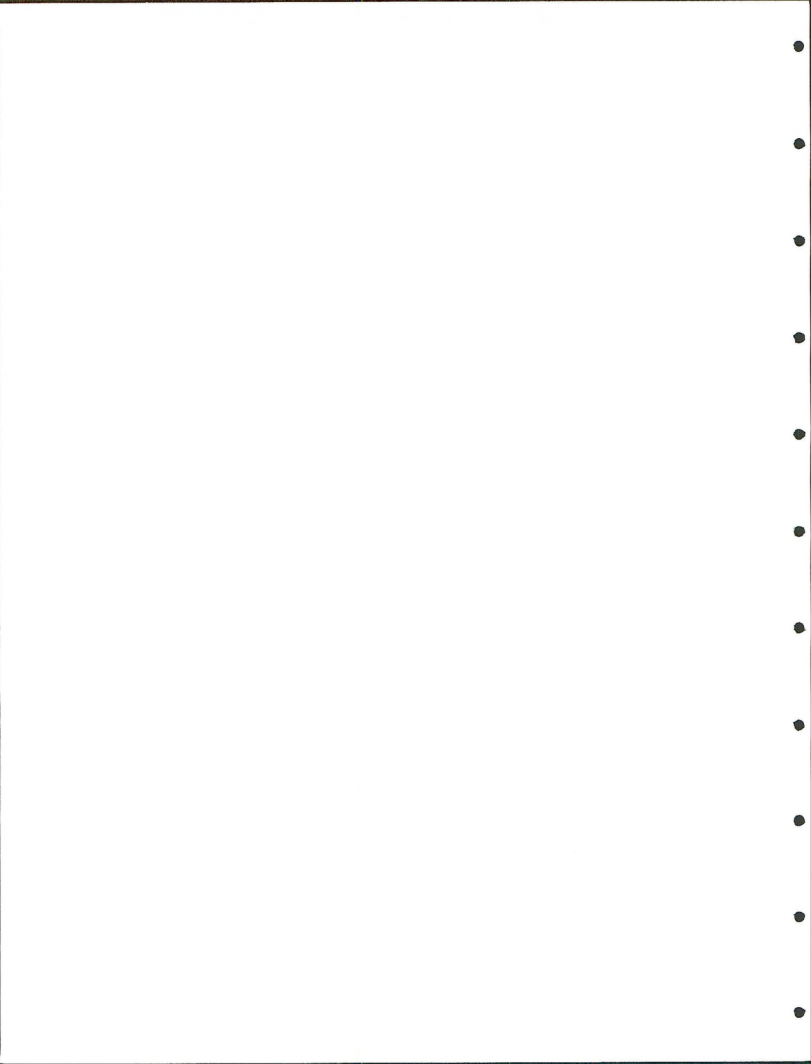
HABITAT: *Bromus/Schismus* grassland with *Atriplex polycarpa*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	7
<i>Sylvilagus</i>	12

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	5
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	1
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Good kit fox habitat. Creek running through this section is very polluted. Creek bed has also been bulldozed.

RECOMMENDATION: Future development should be monitored and approved.



TOWNSHIP RANGE: R31S, R24E

QUADRANGLE: Taft

SECTION NO(s): 20 LAND UNIT: 3 ACREAGE: 320

DATE OF FIELD  
SURVEY: 10 September 1979

FIELD CREW: Cherniss, Swidler

TOPOGRAPHY: Generally flat with several sandy washes running through it.

HABITAT: Scattered *Atriplex* with an understory of *Bromus*, *Schismus*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	14
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	2		

CONCLUSION: Potential kit fox habitat, but evidence of kit fox usage is lacking.

RECOMMENDATION: Any land use should be monitored and approved beforehand.



TOWNSHIP RANGE: R31S, R23E

QUADRANGLE: Taft

SECTION NO(s): 24 LAND UNIT: 3 ACREAGE: 640

DATE OF FIELD  
SURVEY: 10 September 1979

FIELD CREW: Cherniss, Dawson, McCue, Swidler

TOPOGRAPHY: Generally flat, becoming hilly in the southwest corner.

HABITAT: *Atriplex* and scattered *Hymenoclea*, *Isomeris* cover with *Bromus*, *Plantago*, *Lepidium*, *Schismus* understory. Few oil wells are scattered through the section.

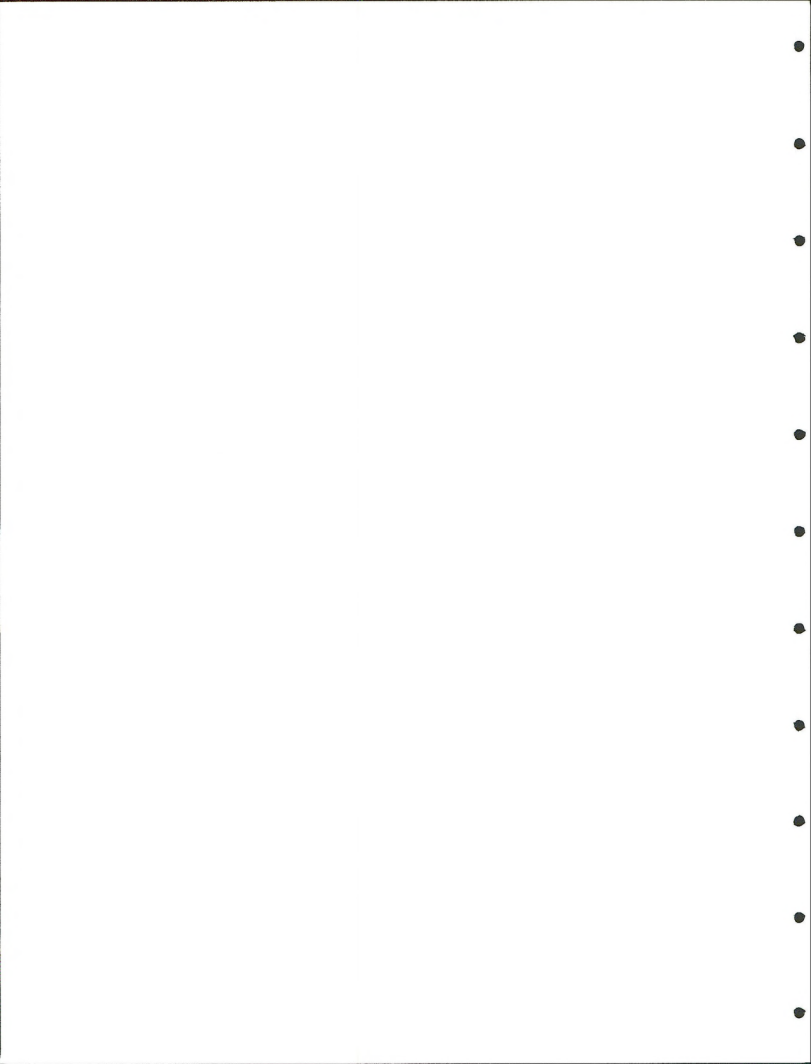
	<u>Total</u>
<i>Lepus</i>	11
<i>Sylvilagus</i>	6

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	3	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	1
Inactive multiple (IM)	3		
Active single (AS)	3		
Inactive single (IS)	1		

CONCLUSION: Excellent kit fox habitat, with evidence indicating high degree of use by fox. One *Crotaphytus silus* seen in this section.

RECOMMENDATION: Any land use should be monitored and approved beforehand. Gross disturbances should be avoided.



TOWNSHIP RANGE: R31S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 12 LAND UNIT: 3 ACREAGE: 160

DATE OF FIELD SURVEY: 14 September 1979

FIELD CREW: Cherniss, Dawson, Sauls, Swidler

TOPOGRAPHY: Generally flat.

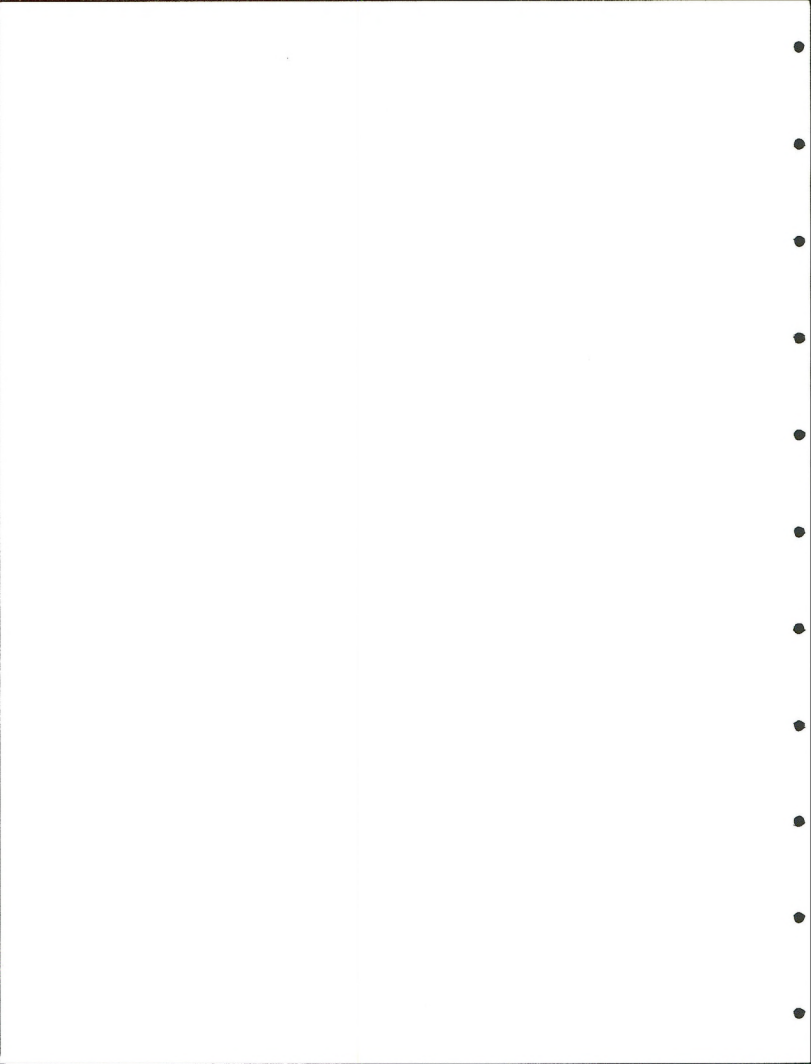
HABITAT: *Atriplex polycarpa* and *Atriplex spinifera* are the dominant shrubs with *Bromus* and *Schismus* the main grasses; other annuals include *Eremocarpus* and *Salsola*. Area is slightly developed for oil.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	10
<i>Sylvilagus</i>	2

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	2
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	2
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	1		

CONCLUSION: Good kit fox habitat. Disturbances are minimal and tend to be near the section boundaries.

RECOMMENDATION: Further development of this area should be monitored, and major disturbances should be avoided.





TOWNSHIP RANGE: R30S, R22E

QUADRANGLE: West Elk Hills

SECTION NO(s): 22 LAND UNIT: 3 ACREAGE: 640

DATE OF FIELD  
SURVEY: 11 September 1979

FIELD CREW: Cherniss, Kato, McCue, Swidler

TOPOGRAPHY: Gently rolling hills running north-south.

HABITAT: *Atriplex polycarpa* with a *Bromus*, *Plantago*, *Schismus* complex.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	11
<i>Sylvilagus</i>	2

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	2	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	3		
Inactive single (IS)	1		

CONCLUSION: Very good kit fox habitat, as the evidence indicates. One *Crotaphytus silus* hatchling seen in this section.

RECOMMENDATION: Land use should be monitored and approved beforehand.



TOWNSHIP RANGE: R30S, R22E

QUADRANGLE: West Elk Hills

SECTION NO(s): 22 LAND UNIT: 3 ACREAGE: 640

DATE OF FIELD  
SURVEY: 10 September 1979

FIELD CREW: Dawson, Kato, McCue, Sauls

TOPOGRAPHY: Generally flat, becoming hilly toward the northeast corner.

HABITAT: *Atriplex*, scattered *Gutierrezia* in the flats with *Bromus*, *Schismus*, *Lepidium*, *Plantago*, and *Eremocarpus*. Southern half of this section is very disturbed with oil and gas development.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	25
<i>Sylvilagus</i>	10

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	2	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION: Good kit fox habitat, especially in areas of none to moderate disturbances. Southeast corner of section is highly disturbed, with many roads, wells, tank settings, and sumps.

RECOMMENDATION: Further development should be monitored, especially in the north and west portions of the section.



TOWNSHIP RANGE: R22E, T30S

QUADRANGLE: West Elk Hills

SECTION NO(s): 10 LAND UNIT: 3 ACREAGE: 640

DATE OF FIELD  
SURVEY: 11 September 1979

FIELD CREW: Dawson, Sauls

TOPOGRAPHY: Gentle, northeast running ridges and washes.

HABITAT: Mosaic vegetation is good to sparse, with cover depending on slope exposure. Largely undisturbed.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	15
<i>Sylvilagus</i>	2

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION: Good potential kit fox habitat, but no positive sign observed.

RECOMMENDATION: Further development should be monitored and approved.



TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: West Elk Hills

SECTION NO(s): 2 LAND UNIT: 3 ACREAGE: 240

DATE OF FIELD  
SURVEY: 12 September 1979

FIELD CREW Kato, McCue, Swidler

TOPOGRAPHY: Steep hills on the western edge of the section. Rolling hills to the east.

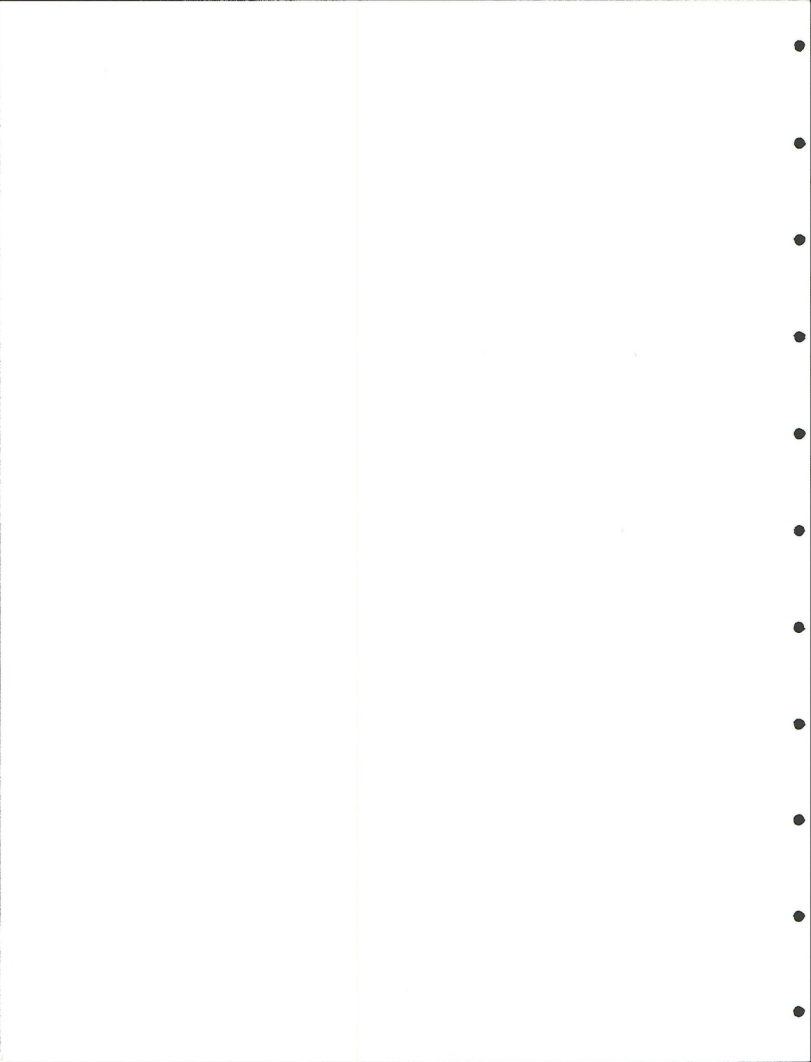
HABITAT: Cover: *Atriplex*, with *Bromus* and *Schismus* understory. Oil development intense in the eastern end.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	3
<i>Sylvilagus</i>	2

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	2
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Western (hilly) portion of this section is fair fox habitat, and an active natal den indicates usage. (All scats were observed at this end also.) The lower (eastern) end is very disturbed due to oil development and is poor kit fox habitat.

RECOMMENDATION: Further development in the hills should be kept to a minimum and monitored.





TOWNSHIP RANGE: T29S, R22E

QUADRANGLE: Reward

SECTION NO(s): 32 LAND UNIT: 3 ACREAGE: 320

DATE OF FIELD  
SURVEY: 6 November 1979

FIELD CREW: Kato, McCue

TOPOGRAPHY: Mostly flat.

HABITAT: *Bromus* and *Schismus* grassland with *Atriplex spinifera* regularly distributed throughout.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	3
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	1
Active multiple (AM)	0	Prey remains	1
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	1		

CONCLUSION: Potential kit fox habitat.

RECOMMENDATION: Area should be monitored and future development approved beforehand.



TOWNSHIP RANGE: T30S, R22E

QUADRANGLE: West Elk Hills

SECTION NO(s): 47 LAND UNIT: 3 ACREAGE: 640

DATE OF FIELD  
SURVEY: 11 September 1979

FIELD CREW: Cherniss, Kato, McCue, Swidler

TOPOGRAPHY: Flat, deep wash runs through the north end of the section.

HABITAT: Undisturbed, with *Bromus*, *Schismus*, and *Atriplex polycarpa*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION: Potential kit fox habitat. *Crotaphytus silus* also observed in this area.

RECOMMENDATION: Any future development should be monitored and approved.



TOWNSHIP RANGE: SE 1/4 NW 1/4

QUADRANGLE: West Elk Hills

SECTION NO(s): 26Z LAND UNIT: 3 ACREAGE: 320

DATE OF FIELD  
SURVEY: 10 September 1979

FIELD CREW: Kato, Sauls

TOPOGRAPHY: Flat, becoming hilly in southern portion of the southeast corner.

HABITAT: NW 1/4 and north half of SE 1/4 are disturbed with wells and roads. *Bromus*, *Atriplex*, *Salsola*, and *Hymenoclea*. Southern portions: mixed *Bromus*, *Schismus*, *Lepidium*, *Plantago*, and *Atriplex polycarpa*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	4
<i>Sylvilagus</i>	5

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	2	Prey remains	0
Inactive multiple (IM)	0		.
Active single (AS)	3		
Inactive single (IS)	0		

CONCLUSION: Southeast 1/4 section good kit fox habitat. The rest is disturbed but may be being used by foxes.

RECOMMENDATION: Further development in the southeast 1/4 should be monitored and approved.



TOWNSHIP RANGE: T29S, R22E

QUADRANGLE: Lokern

SECTION NO(s): 4

LAND UNIT: 3

ACREAGE: 120

DELETED FROM SURVEY





TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Fellows and West Elk Hills

SECTION NO(s): 9 LAND UNIT: 4 ACREAGE: 480

DATE OF FIELD  
SURVEY: 27 September 1979

FIELD CREW: Kato, McCue, Sauls, Swidler

TOPOGRAPHY: Generally flat on the eastern half, hilly in the western half.

HABITAT: *Atriplex polycarpa*, with *Bromus*, *Festuca*, *Eremocarpus*, *Lepidium*, and *Astragalus*. Generally undisturbed, with some roads and abandoned wells.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	17
<i>Sylvilagus</i>	13

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey Remains	0
Inactive multiple (IM)	3		
Active single (AS)	3		
Inactive single (IS)	1		

CONCLUSION: Good to very good kit fox habitat. Few roads through the section; some oil development in the southeast corner, but evidence of kit fox observed in that area also. *Eriogonum gossypinum* was found in this section.

RECOMMENDATION: Further development and activity on this area should be carefully monitored.



TOWNSHIP RANGE: T31S, R22E

QUADRANGE: Panorama Hills

SECTION NO(s): 8

LAND UNIT: 4

ACREAGE: 160

DATE OF FIELD  
SURVEY:

1 November 1979

FIELD CREW: McCue

TOPOGRAPHY: Rolling hills.

HABITAT: *Bromus* grassland.

PREY BASE:

Total

*Lepus*

0

*Sylvilagus*

0

EVIDENCE OF  
KIT FOX:

Total

Total

Active natal (AN)

0

Scats

1

Inactive natal (IN)

0

Tracks

0

Active multiple (AM)

0

Prey remains

0

Inactive multiple (IM)

0

Active single (AS)

0

Inactive single (IS)

0

CONCLUSION: Potentially good kit fox habitat.

RECOMMENDATION: Grazing and development should be monitored.



TOWNSHIP RANGE: T30S, R22E

QUADRANGLE: Reward

SECTION NO(s): 30 and 29 NW LAND UNIT: 4 ACREAGE: 304

DATE OF FIELD  
SURVEY: 5 November 1979

FIELD CREW: Kato, McCue

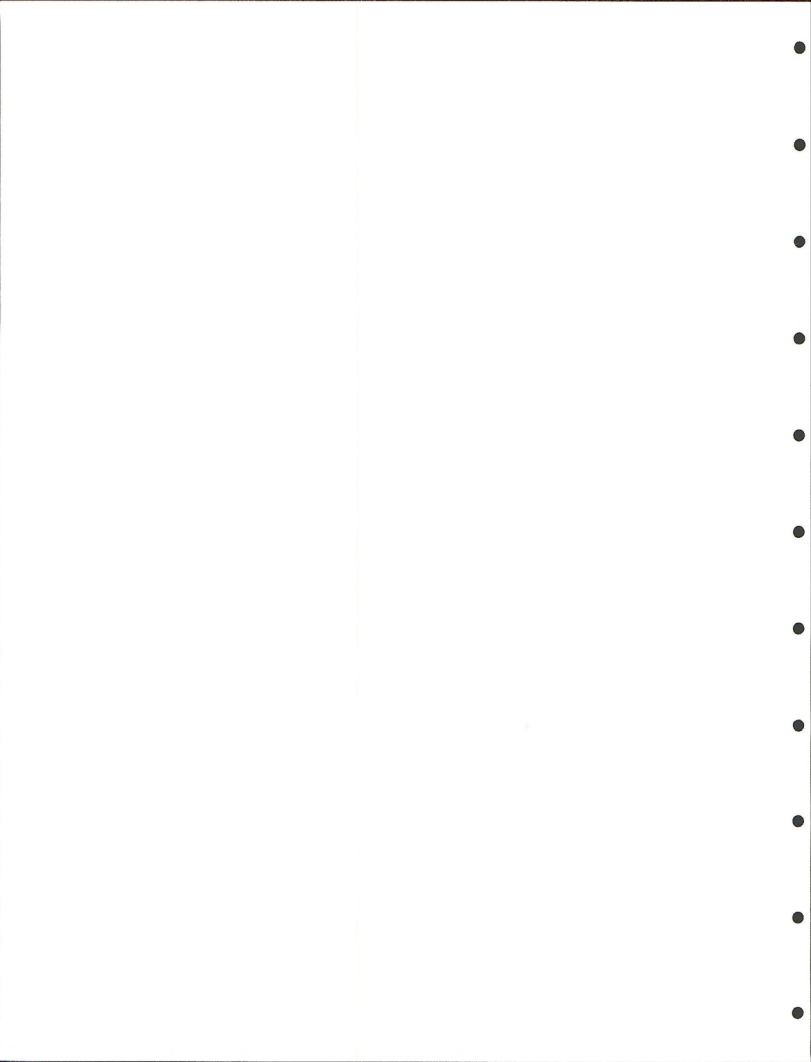
TOPOGRAPHY: Gently rolling hills throughout this section. There is much oil field development and many roads in the western half.

HABITAT: Mostly *Bromus* and *Schizanthus* grassland with scattered *Atriplex polycarpa* and *Atriplex spinifera*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	12
<i>Sylvilagus</i>	9

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION: Minimal potential as kit fox habitat. The area is grazed by sheep, developed for oil and gas, and has two major highways in close proximity to it.



TOWNSHIP RANGE: T30S, R22E

QUADRANGLE: Reward

SECTION NO(s): 29(S)

LAND UNIT: 4

ACREAGE: 320

DATE OF FIELD  
SURVEY:

5 November 1979

FIELD CREW:

Kato, McCue

TOPOGRAPHY:

Gently rolling hills and small flat valleys with many roads throughout this section.

HABITAT:

Grassland of *Bromus* and *Schismus* with *Atriplex spinifera* being the dominant shrub.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	23
<i>Sylvilagus</i>	8

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION:

Minimal potential as kit fox habitat. The area is highly disturbed by oil development and has Highway 33 running through it.





TOWNSHIP RANGE: T30S, R22E

QUADRANGLE: Reward

SECTION NO(s): 4

LAND UNIT: 4

ACREAGE: 100

DELETED FROM SURVEY



TOWNSHIP RANGE: T31S, R22E

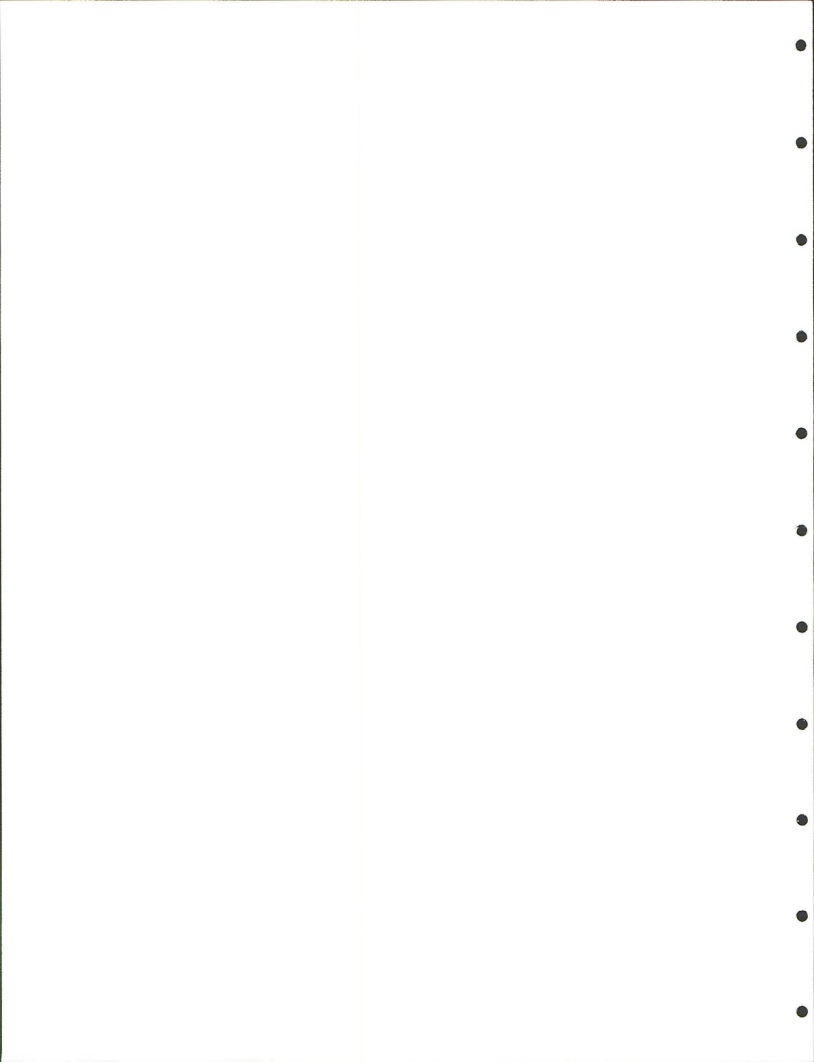
QUADRANGLE: Reward

SECTION NO(s): 5

LAND UNIT: 4

ACREAGE: 100

DELETED FROM SURVEY



TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Reward

SECTION NO(s): 8

LAND UNIT: 4

ACREAGE: 48

DELETED FROM SURVEY



TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Panorama Hills

SECTION NO(s): 7 LAND UNIT: 4 ACREAGE: 416

DATE OF FIELD  
SURVEY: 31 October 1979

FIELD CREW: Kato, Sauls

TOPOGRAPHY: Rolling hills with some steep slopes and deep wash cuts.  
Parallel northeast running ridges in some parts.

HABITAT: Mostly *Bromus* and *Schismus* with some *Atriplex polycarpa*,  
*Haplopappus*, *Gutierrezia*, and *Astragalus*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	3
Inactive natal (IN)	0	Tracks	1
Active multiple (AM)	3	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	4		
Inactivie single (IS)	0		

CONCLUSION: This area is being used by at least one pair of breeding foxes.  
Washes and gullies appear to be good habitat.

RECOMMENDATION: Grazing and development should be controlled and monitored.





TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: West Elk Hills

SECTION NO(s): 4 LAND UNIT: 4 ACREAGE: 336

DATE OF FIELD SURVEY: 12 September 1979

FIELD CREW: Cherniss, Dawson, Sauls, Swidler

TOPOGRAPHY: Steep east-running ridges and arroyo in western portion; gentle valley bottom to the east.

HABITAT: Good grass cover on ridges to the west; varied mosaic of shrubs. Valley bottom to the east is grazed; surface graded in some areas. Largely undisturbed.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	12
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	0
Inactive natal (IN)	1	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	4		
Inactive single (IS)	0		

CONCLUSION: Good fox habitat; foxes present.

RECOMMENDATION: Future development should be monitored and approved.



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Fellows

SECTION NO(s): 5 LAND UNIT: 5 ACREAGE: 80

DATE OF FIELD  
SURVEY: 23 October 1979

FIELD CREW: Sauls

TOPOGRAPHY: Flat, with two washes running through the area.

HABITAT: Formerly disturbed, now recovering. Mostly *Bromus*, *Atriplex polycarpa*, and *Hymenoclea*. There are roads, an old railroad, and a dump site in a wash.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION: Too small to be important to a breeding population. Foxes present, probably using this as part of a hunting territory. The area is a good example of once disturbed, and now recovering habitat.



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Maricopa

SECTION NO(s): 35 S 1/2

LAND UNIT: 5

ACREAGE: 320

DATE OF FIELD  
SURVEY: 22 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Hilly throughout the section; some areas with steep slopes.

HABITAT: Mostly *Bromus* with scattered *Atriplex*; some *Eriogonum fasciculatum* and *Gutierrezia* scattered on exposed hillsides.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION: Minimal potential as kit fox habitat. No solid evidence of fox was observed, and the terrain in some areas was very rugged with little accessible flat areas.



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Fellows

SECTION NO(s): 4 LAND UNIT: 5 ACREAGE: 280

DATE OF FIELD  
SURVEY: 23 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Flat; bisected by several washes.

HABITAT: An understory of *Bromus* and *Schismus* with a shrub cover of mostly *Atriplex*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	3
<i>Sylvilagus</i>	3

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Minimal potential as kit fox habitat. Little evidence of kit fox activity was observed. The section is lightly developed for oil, but has many roads through it.





TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Maricopa

SECTION NO(s): 27 LAND UNIT: 5 ACREAGE: 160

DATE OF FIELD  
SURVEY: 23 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Generally rolling hills.

HABITAT: *Bromus* and *Schismus* grassland; scattered *Eriogonum fasciculatum*,  
*Eurotia*, *Hymenoclea*, and *Atriplex*. Fairly disturbed by oil  
activity in the area.

PREY BASE: Total

<i>Lepus</i>	2
<i>Sylvilagus</i>	4

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	2
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	1
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	3		

CONCLUSION: Marginal potential kit fox habitat.



TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 24 LAND UNIT: 5 ACREAGE: 480 (all but SW 1/4)

DATE OF FIELD SURVEY: 13 September 1979

FIELD CREW: Kato, McCue, Sauls, Swidler

TOPOGRAPHY: Flats, with several washes.

HABITAT: Eastern portion less disturbed. Mostly flat grassland with *Bromus*, *Schismus*, *Festuca*, and *Atriplex polycarpa* in northwest corner. Northern portions very disturbed by oil development, polluted washes, Pipeline Road.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	6
<i>Sylvilagus</i>	14

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	3
Inactive natal (IN)	0	Tracks	1
Active multiple (AM)	3	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	3		
Inactive single (IS)	0		

CONCLUSION: Marginal kit fox habitat with foxes present in the northern and eastern portions which are less disturbed. Washes in this area are polluted posing potential threat to wildlife.

RECOMMENDATION: Future development in these less disturbed areas should be monitored.



TOWNSHIP RANGE: T31S, R23E

QUADRANGLE: Fellows

SECTION NO(s): 32 LAND UNIT: 5 ACREAGE: 260

DATE OF FIELD  
SURVEY: 14 September 1979

FIELD CREW: Cherniss, Dawson, Sauls, Swidler

TOPOGRAPHY: Flats with several washes.

HABITAT: Mostly grassland, *Bromus*, *Schismus*, *Plantago*, *Lepidium*, and  
*Atriplex polycarpa*. Looks formerly disturbed by oil activity.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	12
<i>Sylvilagus</i>	26

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION: Area has been more disturbed in the past; and is now recovered to a large extent. Foxes are present and habitat potential is good. Foxes are using abandoned tank site retention walls to build dens in.

RECOMMENDATION: Future further development should be monitored. This section would be ideal for further study on habitat recovery.



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Midway, Taft

SECTION NO(s): 10 LAND UNIT: 5 ACREAGE: 480

DATE OF FIELD  
SURVEY: 12 September 1979

FIELD CREW: Kato, McCue

TOPOGRAPHY: Generally flat.

HABITAT: *Atriplex polycarpa* and *Atriplex spinifera*; with *Bromus rubens*,  
*Schismus*, *Eremocarpus*, *Salsola*, and *Centaurea*. Moderately  
disturbed with roads, buildings, and Highway 33.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	10
<i>Sylvilagus</i>	14

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION: Potential kit fox habitat. Probably being used as a hunting area for kit fox, but not for raising pups. Disturbed area southwest of Highway 33. Some areas have been bulldozed and revegetated with *Centaurea* and *Salsola*. There are buildings in middle of section, and along part of east border. In general, the area northeast of Highway 33 is less disturbed.

RECOMMENDATION: Further development in this area should be monitored.





TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Midway, Fellows

SECTION NO(s): 9

LAND UNIT: 5

ACREAGE: 160

DATE OF FIELD  
SURVEY:

23 October 1979

FIELD CREW: Kato, McCue

TOPOGRAPHY: Generally flat in the east; wash running west to east.

HABITAT: *Atriplex* and *Bromus* grassland.

PREY BASE:

Total

*Lepus*

2

*Sylvilagus*

1

EVIDENCE OF  
KIT FOX:

Total

Total

Active natal (AN)

0

Scats

0

Inactive natal (IN)

1

Tracks

0

Active multiple (AM)

0

Prey remains

0

Inactive multiple (IM)

0

Active single (AS)

0

Inactive single (IS)

0

CONCLUSION: A large inactive natal den was observed in this section, indicating past use by kit fox.

RECOMMENDATION: Den may be used again, so this area should be protected. Development should be monitored.



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Midway, Maricopa

SECTION NO(s): 35 NE 1/4

LAND UNIT: 5

ACREAGE: 160

DELETED FROM SURVEY



TOWNSHIP RANGE: T32S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 2

LAND UNIT: 6

ACREAGE: 528

DATE OF FIELD

SURVEY: 24 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Almost totally *Bromus*; *Atriplex* limited to valleys; scattered *Isomeris* and *Hymenoclea*.

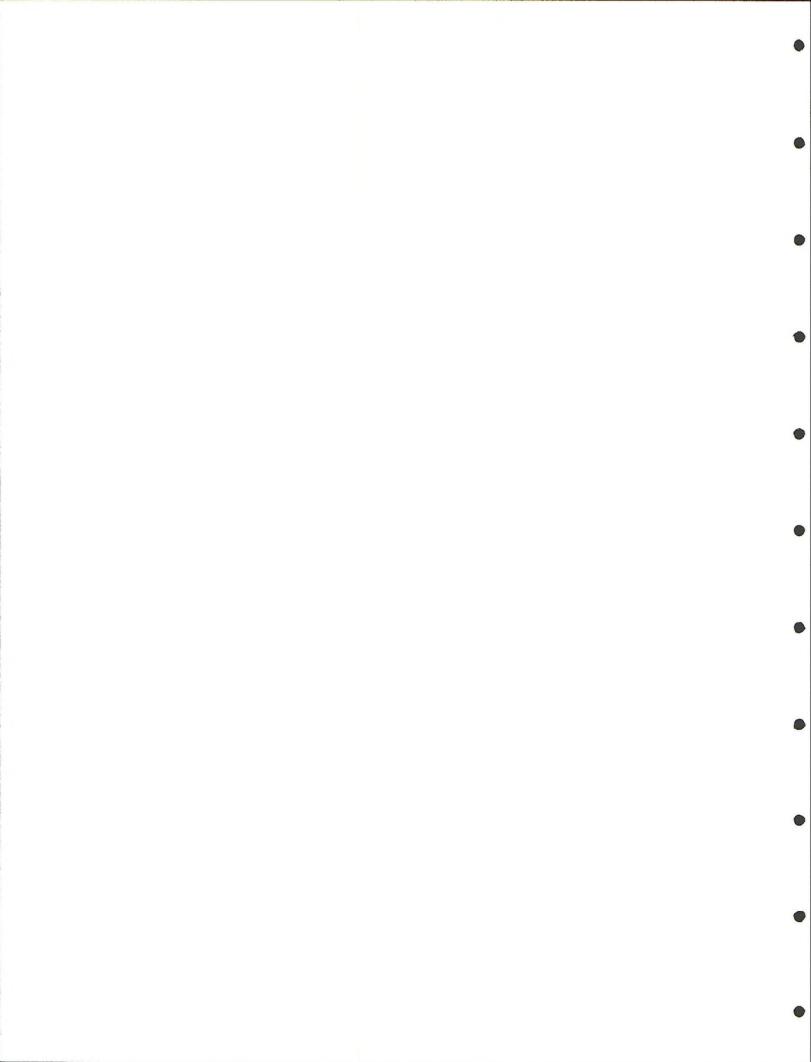
HABITAT:

	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	7
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Low potential as kit fox habitat.



TOWNSHIP RANGE: T31S, R23E

QUADRANGLE: Fellows

SECTION NO(s): 34 LAND UNIT: 6 ACREAGE: 320

DATE OF FIELD  
SURVEY: 20 September 1979

FIELD CREW: Dawson, McCue, Sauls, Swidler

TOPOGRAPHY: Steep ridges and washes.

HABITAT: Undisturbed grassland; some slopes with mosaic of shrubs.  
Disturbed by grazing in some area.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	5
Inactive natal (IN)	1	Tracks	0
Active multiple (AM)	3	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	2		
Inactive single (IS)	1		

CONCLUSION: One natal den was observed. The other areas may be too hilly.  
Prey base was low.

RECOMMENDATION: Development and heavy grazing should be avoided.





TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Panorama Hills

SECTION NO(s): 18 LAND UNIT: 6 ACREAGE: 224

DATE OF FIELD  
SURVEY: 2 November 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Rolling hills with deep wash cuts.

HABITAT: Mostly grassland of *Bromus*, *Schismus*, and *Astragalus*. There are a few perennials near the drainage, mostly *Haplopappus*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: The flats to the east are potential kit fox habitat. Natal dens were observed just off BLM land.

RECOMMENDATION: Development in this area should be prevented if at all possible.



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Fellows

SECTION NO(s): 18 LAND UNIT: 6 ACREAGE: 400

DATE OF FIELD SURVEY: 25 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Rolling hills in the northeast, becoming increasingly steep toward the southwest.

HABITAT: *Bromus* and *Schismus* understory with a scattered *Atriplex* canopy. Extensively grazed in flat areas.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Potential kit fox habitat.

RECOMMENDATION: Studies could be done here on grazing, and its effects on prey abundance. Area should be monitored.



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Panorama Hills

SECTION NO(s): 20

LAND UNIT: 6

ACREAGE: 480

DATE OF FIELD  
SURVEY:

1 November 1979

FIELD CREW:

Kato, McCue

TOPOGRAPHY:

Generally flat in the northeast portions, becoming hilly toward the southwest.

HABITAT:

Mainly grassland of *Bromus*, *Schismus*, *Festuca*, and *Astragalus*, with scattered perennial, mostly *Gutierrezia*.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	4		
Inactive single (IS)	0		

CONCLUSION:

Potential kit fox habitat, especially in flatter areas to the north. Grazing is the main disturbance in this section.

RECOMMENDATION:

Further activity on this land should be monitored.



TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 28 W 1/2

LAND UNIT: 6

ACREAGE: 320

DATE OF FIELD  
SURVEY:

25 September 1979

FIELD CREW:

Kato, McCue, Sauls

TOPOGRAPHY:

Hilly to mountainous.

HABITAT:

Grass land mostly of *Bromus*, *Festuca*, and *Schismus*, with the predominant perennial being *Atriplex polycarpa* plus scattered *Gutierrezia* and *Isomeris*.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

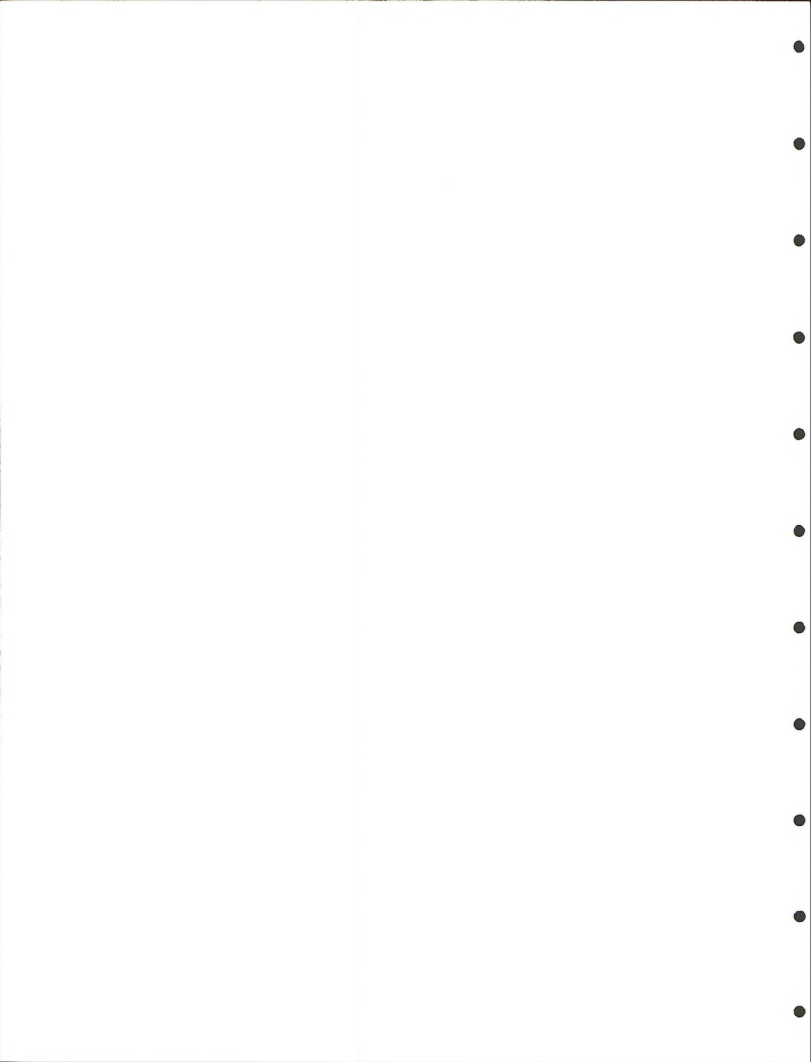
	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	1		

CONCLUSION:

The area is mostly undisturbed, but seems lacking in fox population. It may be too hilly or prey base too scarce. The area is grazed by cattle.

RECOMMENDATION:

Further development should be monitored.





TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 33 LAND UNIT: 6 ACREAGE: 768

DATE OF FIELD  
SURVEY: 26 September 1979

FIELD CREW: Kato, McCue, Sauls, Swidler

TOPOGRAPHY: Hilly to mountainous.

HABITAT: Thick annual growth of *Bromus*; diverse mosaic of shrubs including *Atriplex*, *Eastwoodia*, *Ephedra*, *Eriogonum fasciculatum*, *Eurotia*, and *Hymenoclea*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	2
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	9	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	9		
Inactive single (IS)	4		

CONCLUSION: A beautiful, undisturbed mountainous section. Little evidence of kit fox; may be too hilly or prey base too scarce.

RECOMMENDATION: Future development should be monitored.



TOWNSHIP RANGE: T32S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 35 LAND UNIT: 6 ACREAGE: 192

DATE OF FIELD  
SURVEY: 13 September 1979 (NE 1/4) and 17 September 1979 (S 1/4)

FIELD CREW: Sauls, Swidler

TOPOGRAPHY: Northeast 1/4 is flats; hilly in the southern portion; south 1/4 strip is steep rolling hills.

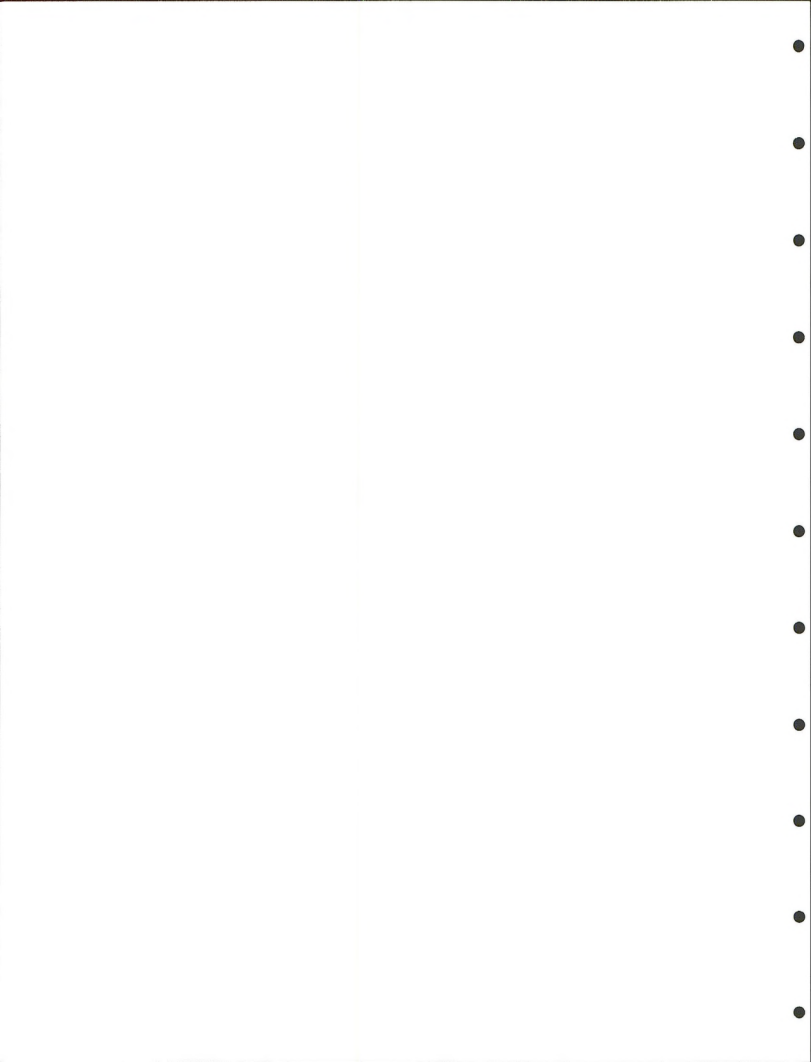
HABITAT: Northeast 1/4 is disturbed roads and wells. *Ambrosia* and *Marrubium*. South portion is mostly thick grassland, *Bromus*, *Festuca*, and *Atriplex polycarpa*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	2		

CONCLUSION: Disturbed habitat in the northeast. The south looks like potential fox habitat except for hilliness and uncommon prey species.

RECOMMENDATION: Further development should be monitored.



TOWNSHIP RANGE: T32S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 12

LAND UNIT: 6

ACREAGE: 640

DELETED FROM SURVEY



TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Fellows

SECTION NO(s): 20 LAND UNIT: 6 ACREAGE: 480

DATE OF FIELD  
SURVEY: 23 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Rolling hills in the east, becoming steeper in the west. Most washes run to the northeast.

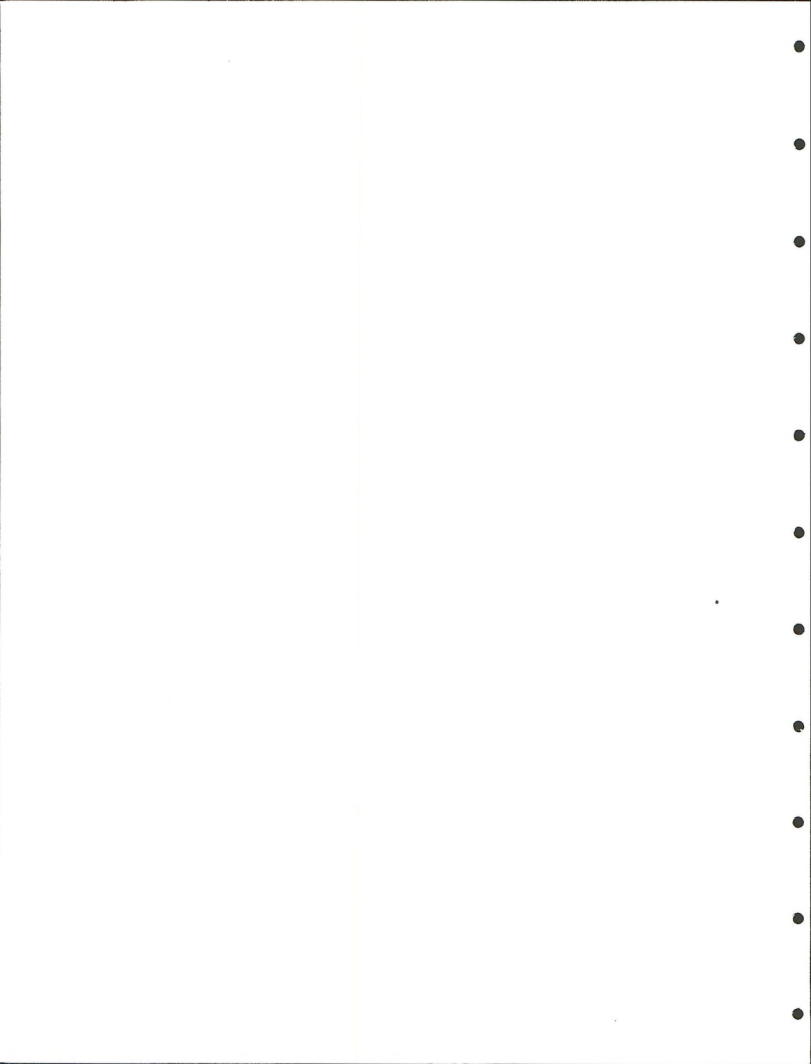
HABITAT: Heavily grazed steep pastures; *Bromus* and *Schismus* grassland, with scattered *Atriplex polycarpa*, *Gutierrezia*, and *Astragalus*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	5
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Good fox habitat, especially flatter areas.

RECOMMENDATION: Grazing and further development should be monitored.





TOWNSHIP RANGE: T32S, R23E

QUADRANGLE: Fellows

SECTION NO(s): 7 LAND UNIT: 6 ACREAGE: 176

DATE OF FIELD  
SURVEY: 24 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Rolling hills and many washes.

HABITAT: Heavy oil development. *Bromus rubens*, *Atriplex polycarpa*, and a few scattered *Isomeris*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	6
<i>Sylvilagus</i>	3

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	5
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	2	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Marginal kit fox habitat, probably used as hunting territory.

RECOMMENDATION: Further development should be monitored.



TOWNSHIP RANGE: T11N, R24W

QUADRANGLE: Maricopa

SECTION NO(s): 9 and 10

LAND UNIT: 7

ACREAGE: 320

DATE OF FIELD

SURVEY:

15 October 1979

FIELD CREW:

Kato, McCue, Sauls

TOPOGRAPHY:

Flat in Section 10, becoming more hilly westward into Section 9. Ridges run generally east-west.

HABITAT:

Grassland of *Bromus* and *Schismus* with perennial cover of *Atriplex spinifera* and *Atriplex polycarpa* in the lower areas, *Eriogonum fasciculatum*, *Eastwoodia*, and *Eurotia* in the hilly areas.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	0

EVIDENCE OF

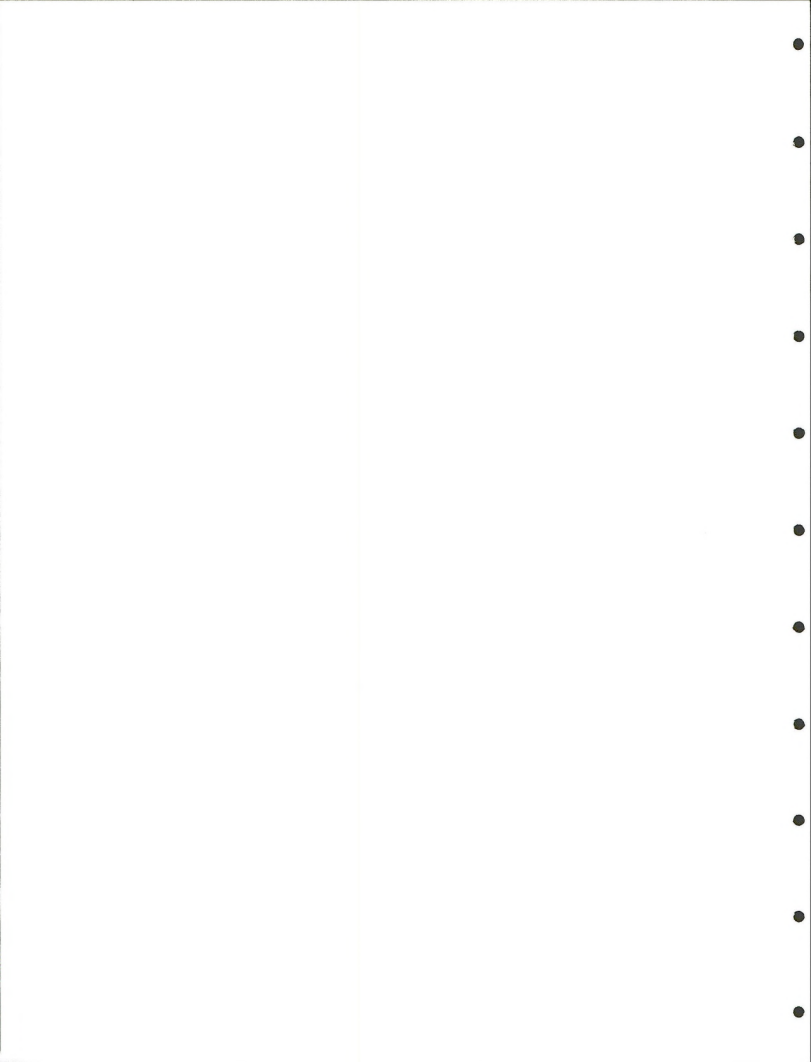
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	4	Scats	8
Inactive natal (IN)	0	Tracks	1
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION:

Excellent kit fox habitat. There are roads through the area leading to the mining operation. The flat and rolling hills area are especially important.

RECOMMENDATION: Activity in this area should be carefully monitored.



TOWNSHIP RANGE: T12N, R24W

QUADRANGLE: Maricopa

SECTION NO(s): 33 S 1/2 (N 1/4 deleted) LAND UNIT: 7 ACREAGE: 320

DATE OF FIELD  
SURVEY: 22 October 1979

FIELD CREW: McCue

TOPOGRAPHY: East end is rolling hills, becoming more mountainous toward the west end.

HABITAT: *Atriplex polycarpa* and *Atriplex spinifera*, dense *Bromus*, *Schismus*, and *Eriogonum fasciculatum*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	4
<i>Sylvilagus</i>	2

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	2
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Potentially good kit fox habitat.



TOWNSHIP RANGE: T12N, R23W

QUADRANGLE: Pentland

SECTION NO(s): 32 LAND UNIT: 7 ACREAGE: 640

DATE OF FIELD  
SURVEY: 25 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Flat, with a low ridge running north to south near middle of the section.

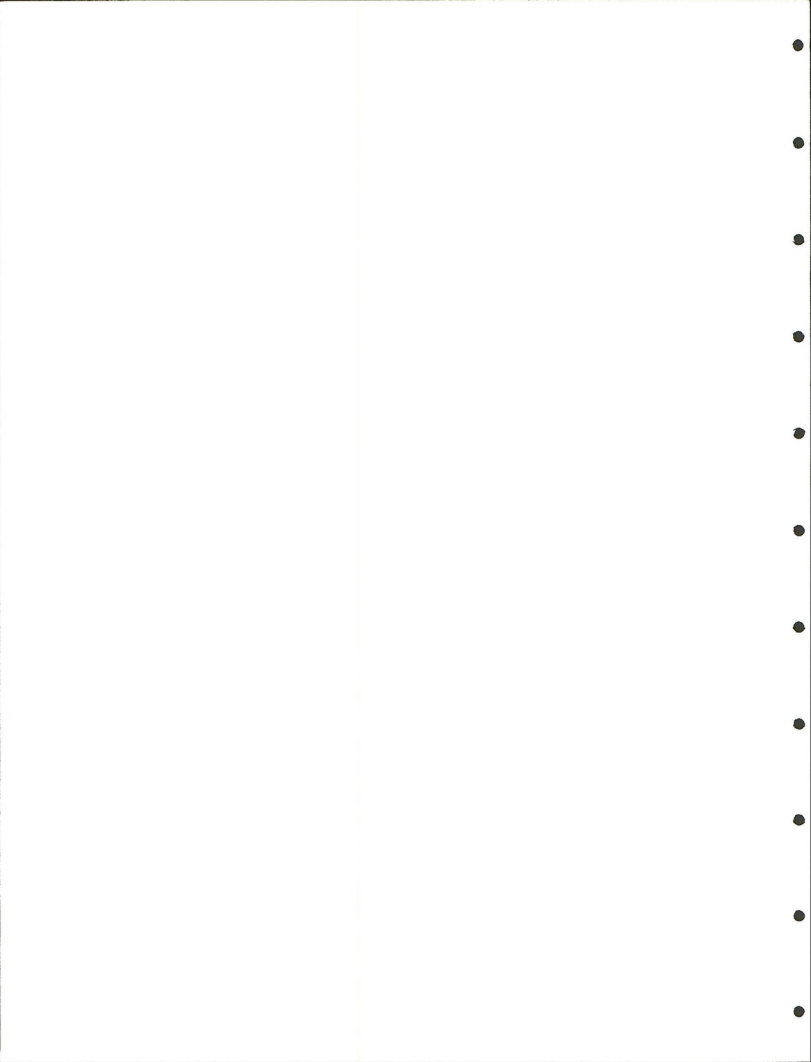
HABITAT: Flats and gentle ridges, highly disturbed. Much of the area is asphalted from old oil strikes. *Bromus*, *Atriplex*, and *Salsola*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	6
<i>Sylvilagus</i>	5

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	4
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	1
Inactive multiple (IM)	2		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION: This area would be considered good kit fox habitat except for wide-scale pollution by oil activities.

RECOMMENDATION: The area may be gradually recovering as habitat, and future development should be monitored.





TOWNSHIP RANGE: T11N, R24W

QUADRANGLE: Maricopa

SECTION NO(s): 3 (S 1/2) and 4 (NE 1/4) LAND UNIT: 7 ACREAGE: 480

DATE OF FIELD  
SURVEY: 16 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Flat to rolling at east end, becoming hilly with steep slopes toward the west end.

HABITAT: *Atriplex spinifera*, *Atriplex polycarpa*, *Bromus*, and *Schismus* with *Eriogonum fasciculatum*, *Eurotia*, and *Eastwoodia*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	3
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	11
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION: Potential kit fox habitat, although only 2 dens were found (several kit fox scats were observed).

RECOMMENDATION: Further developments on this land should be monitored.



TOWNSHIP RANGE: T11N, R24W

QUADRANGLE: Maricopa

SECTION NO(s): 15 (NW 1/4) LAND UNIT: 7 ACREAGE: 176

DATE OF FIELD  
SURVEY: 15 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Flat to rolling hills.

HABITAT: *Atriplex polycarpa*, *Atriplex spinifera*, *Bromus*, and *Schismus*  
grassland. Area is extensively grazed.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	4
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	1		

CONCLUSION: Good to very good kit fox habitat, and evidence indicates their presence. The area is presently grazed, and a nearby mining operation has roads through the section.

RECOMMENDATION: Further activity in the area should be monitored.



TOWNSHIP RANGE: T11N, R27W

QUADRANGLE: Peak Mountain

SECTION NO(s): 32 LAND UNIT: 8 ACREAGE: 192

DATE OF FIELD  
SURVEY: 10 October 1979

FIELD CREW: Kato, McCue

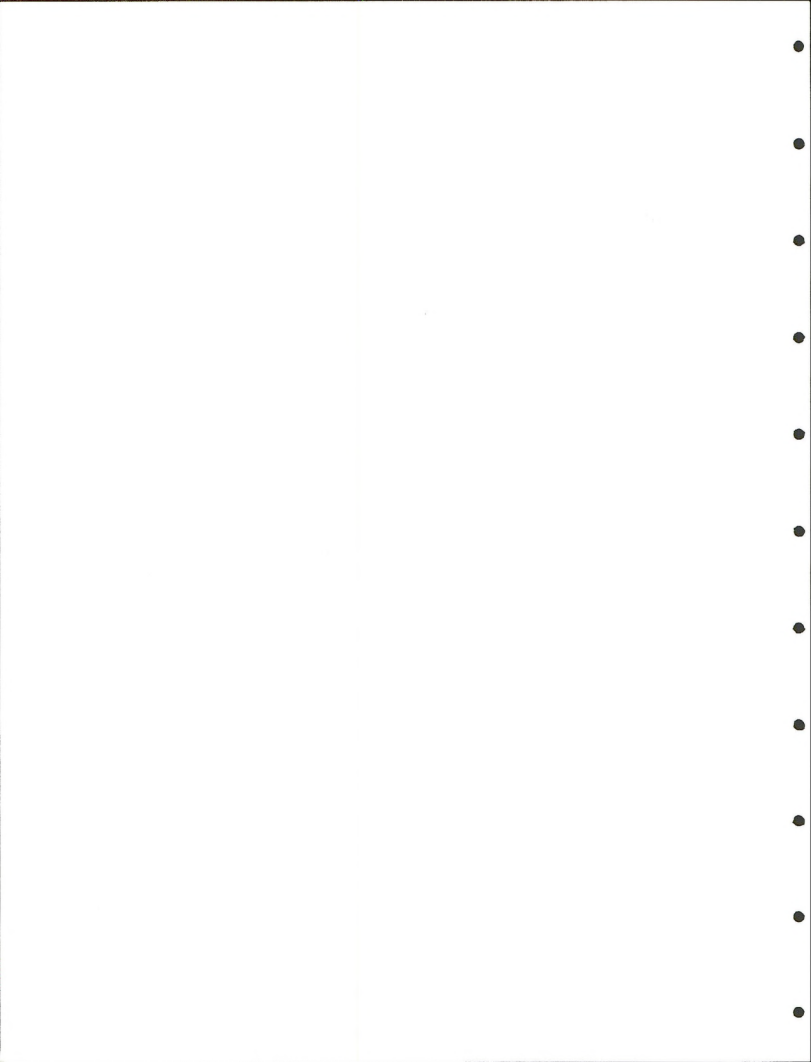
TOPOGRAPHY: Flats and alluvial fans in the south, steep NE-SW running  
ridges in the north.

HABITAT: Grassland (heavily grazed) and *Atriplex* on the flats, mosaic  
shrubs and grassland on the ridges. Largely undisturbed.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Southern portions look like suitable potential kit fox habitat,  
northern portions too steep.



TOWNSHIP RANGE: T10N, R25W

QUADRANGLE: Cuyama

SECTION NO(s): 8 LAND UNIT: 8 ACREAGE: ~350

DATE OF FIELD  
SURVEY: 9 October 1979

FIELD CREW: Sauls

TOPOGRAPHY: Steep slopes in north. One wash running south through center of section flattens out in south.

HABITAT: Flats and washes grazed grassland and *Atriplex*. Ridges with varying shrub and grass cover. Largely undisturbed.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	2

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Flats are potential marginal kit fox habitat. Ridges in the north too rugged for foxes.





TOWNSHIP RANGE: T10N, R25W

QUADRANGLE: Cuyama

SECTION NO(s): 15

LAND UNIT: 8

ACREAGE: ~313

DATE OF FIELD  
SURVEY:

9 October 1979

FIELD CREW:

Kato, McCue, Sauls

TOPOGRAPHY:

Rugged in north, rolling hills to flat in south.

HABITAT:

Flats: grazed grassland and *Atriplex*. Ridges with varying grass and shrub cover. Undisturbed.

PREY BASE:

Total

*Lepus*

3

*Sylvilagus*

2

EVIDENCE OF  
KIT FOX:

Total

Total

Active natal (AN)

0

Scats

0

Inactive natal (IN)

0

Tracks

0

Active multiple (AM)

0

Prey remains

0

Inactive multiple (IM)

0

Active single (AS)

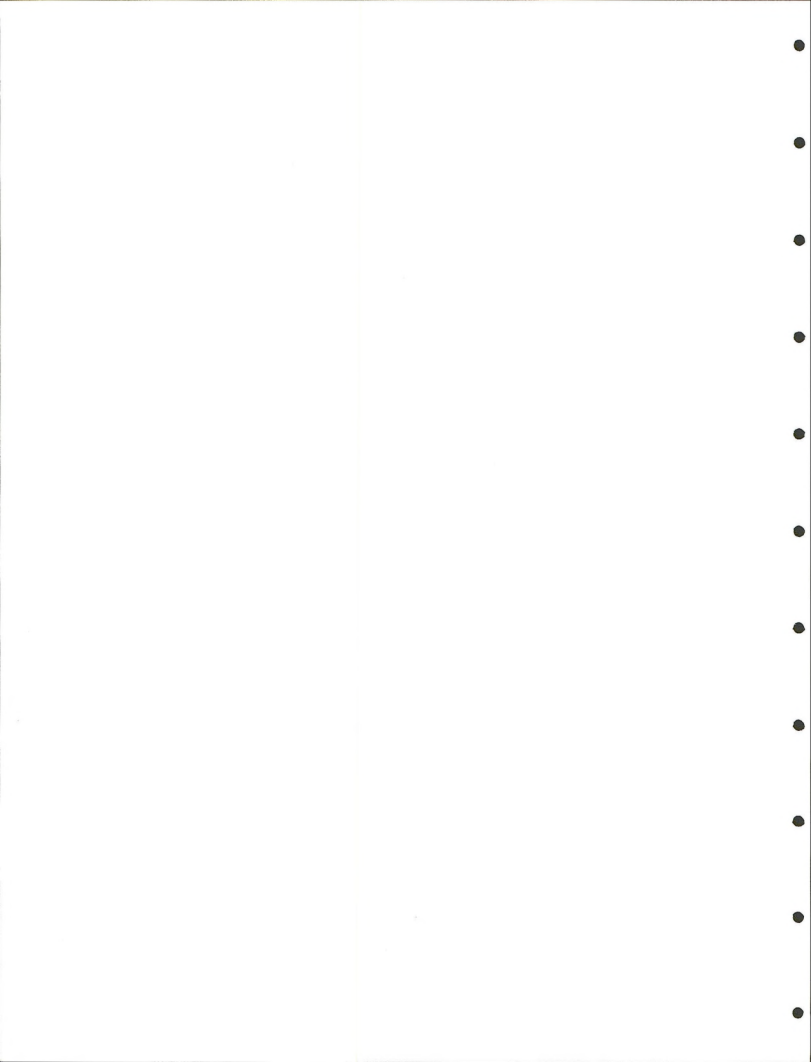
0

Inactive single (IS)

0

CONCLUSION:

Most of the section is too rugged for kit fox habitat. Washes and flats are potentially marginal.



TOWNSHIP RANGE: T10N, R25W

QUADRANGLE: Cuyama

SECTION NO(s): 14

LAND UNIT: 8

ACREAGE: ~474

DATE OF FIELD  
SURVEY:

9 October 1979

FIELD CREW: Kato, McCue, Sauls

TOPOGRAPHY: Rugged in north, rolling hills and flatland in south.

HABITAT: Flats: grazed grassland and *Atriplex polycarpa*. Ridges with varying grass and shrub cover. Largely undisturbed.

PREY BASE:

Total

*Lepus*  
*Sylvilagus*

18  
1

EVIDENCE OF  
KIT FOX:

Total

Total

Active natal (AN)  
Inactive natal (IN)  
Active multiple (AM)  
Inactive multiple (IM)  
Active single (AS)  
Inactive single (IS)

0  
0  
0  
0  
1  
0

Scats  
Tracks  
Prey remains

0  
0  
0

CONCLUSION:

Southern portions (washes and flats) are potential kit fox habitat. Ridges to the north unsuitable kit fox habitat.



TOWNSHIP RANGE: T10N, R25W

QUADRANGLE: Cuyama

SECTION NO(s): 9

LAND UNIT: 8

ACREAGE: ~292

DATE OF FIELD  
SURVEY:

9 October 1979

FIELD CREW:

Kato, McCue

TOPOGRAPHY:

Steep slopes in north and east. Two washes run south through section and flatten out in southwest.

HABITAT:

Flats: grazed and devegetated grassland and *Atriplex*. Ridges with varying shrubs and grass cover. Largely undisturbed.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION:

One definite kit fox den was found just outside the BLM section boundary, which would indicate that the flats and washes in this section may be in use by kit foxes. Northern portions are too rugged to be good fox habitat.



TOWNSHIP RANGE: T10-1/2N, R27W

QUADRANGLE: New Cuyama

SECTION NO(s): 35 LAND UNIT: 8 ACREAGE: ~118

DATE OF FIELD  
SURVEY: 4 October 1979

FIELD CREW: Kato, McCue

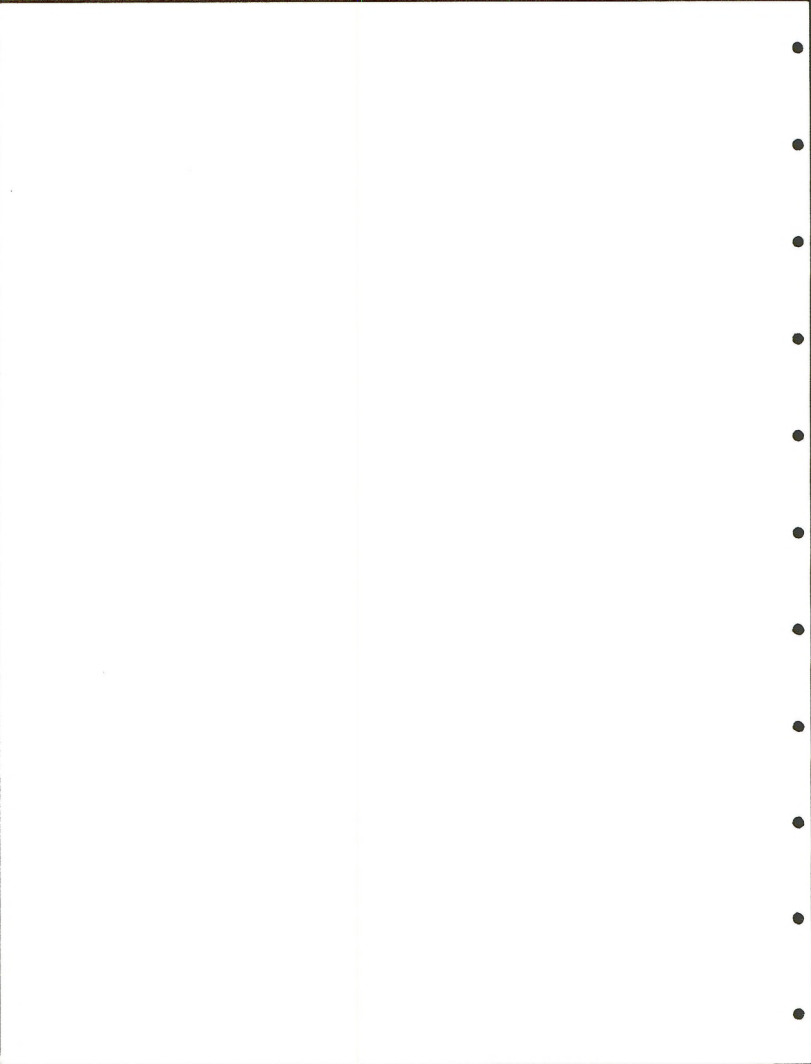
TOPOGRAPHY: Mountainous with steep slopes.

HABITAT: Washes with grazed grassland. Springs present with mosaic plant associations. Ridges with grasses and mosaic of shrubs. Largely undisturbed.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Most of this section is unsuitable kit fox habitat due to ruggedness of terrain. Flats and washes may have marginal potential.





TOWNSHIP RANGE: T10-1/2, 10N, R26W

QUADRANGLE: New Cuyama

SECTION NO(s): 31, 6, and 32      LAND UNIT: 8      ACREAGE: ~522

DATE OF FIELD  
SURVEY: 3 October 1979

FIELD CREW: Kato, McCue

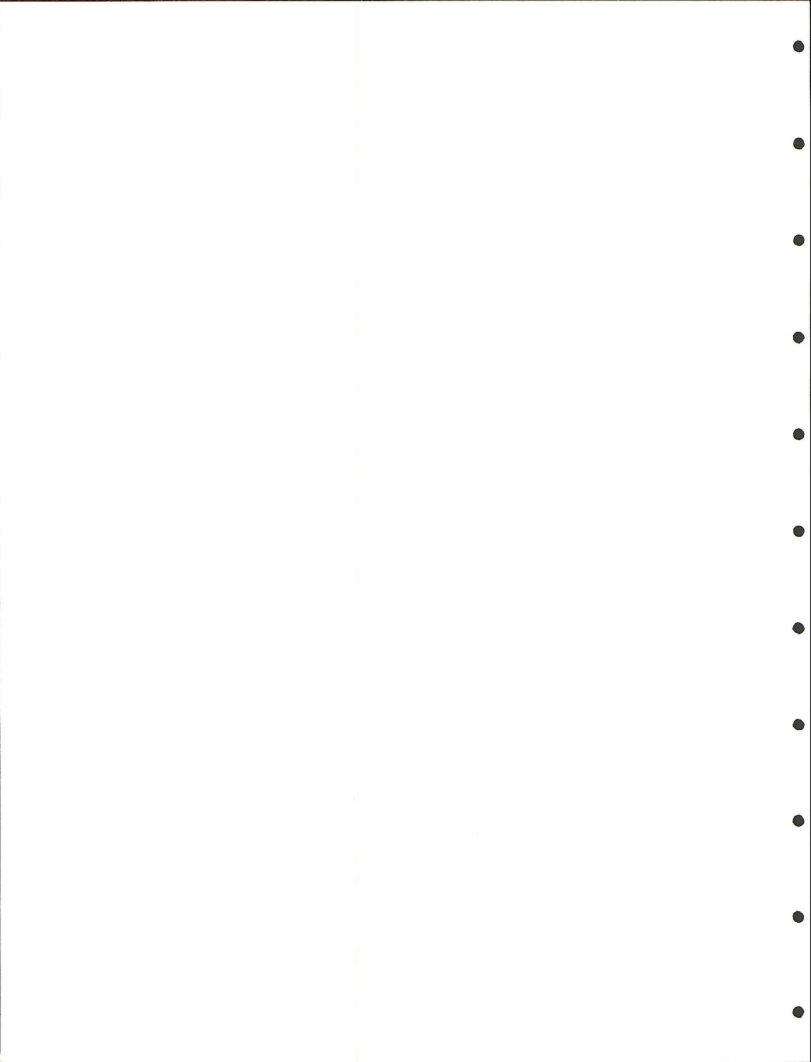
TOPOGRAPHY: Mountainous with steep slopes and deep ravines.

HABITAT: Flats and wash bottoms are grazed grassland and *Atriplex* association. Ridges have varying grass cover and mosaic of shrubs. Largely undisturbed.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	2		
Inactive single (IS)	1		

CONCLUSION: Largely unsuitable for kit fox habitat due to rugged topography. Flats and washes have marginal potential as habitat.



TOWNSHIP RANGE: T10N, R25W

QUADRANGLE: Cuyama

SECTION NO(s): 13

LAND UNIT: 8

ACREAGE: ~608

DATE OF FIELD

SURVEY: 11 October 1979

FIELD CREW: Kato, Sauls

TOPOGRAPHY: Rugged in northeast. Slope decreases to flat land in southwest.

HABITAT: Overgrazed flats, *Bromus*, *Schismus*, and *Atriplex*. Ridges with varying grass and shrubs cover. Largely undisturbed.

PREY BASE:

Total

*Lepus*

4

*Sylvilagus*

0

EVIDENCE OF  
KIT FOX:

Total

Total

Active natal (AN)

0

Scats

0

Inactive natal (IN)

0

Tracks

0

Active multiple (AM)

0

Prey remains

0

Inactive multiple (IM)

0

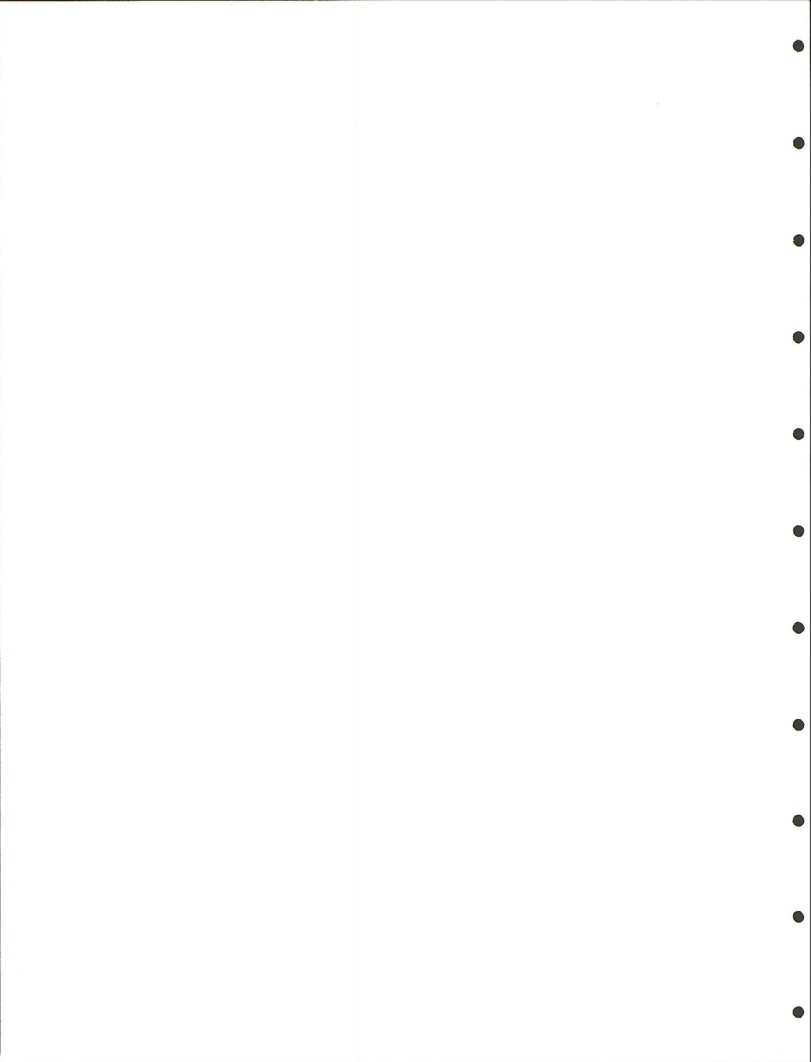
Active single (AS)

0

Inactive single (IS)

0

CONCLUSION: Most of section unsuitable kit fox habitat.



TOWNSHIP RANGE: T10N, R25W

QUADRANGLE: Ballinger Canyon

SECTION NO(s): 13 LAND UNIT: 8 ACREAGE: 320

DATE OF FIELD  
SURVEY: 11 October 1979

FIELD CREW: Kato, McCue, Sauls

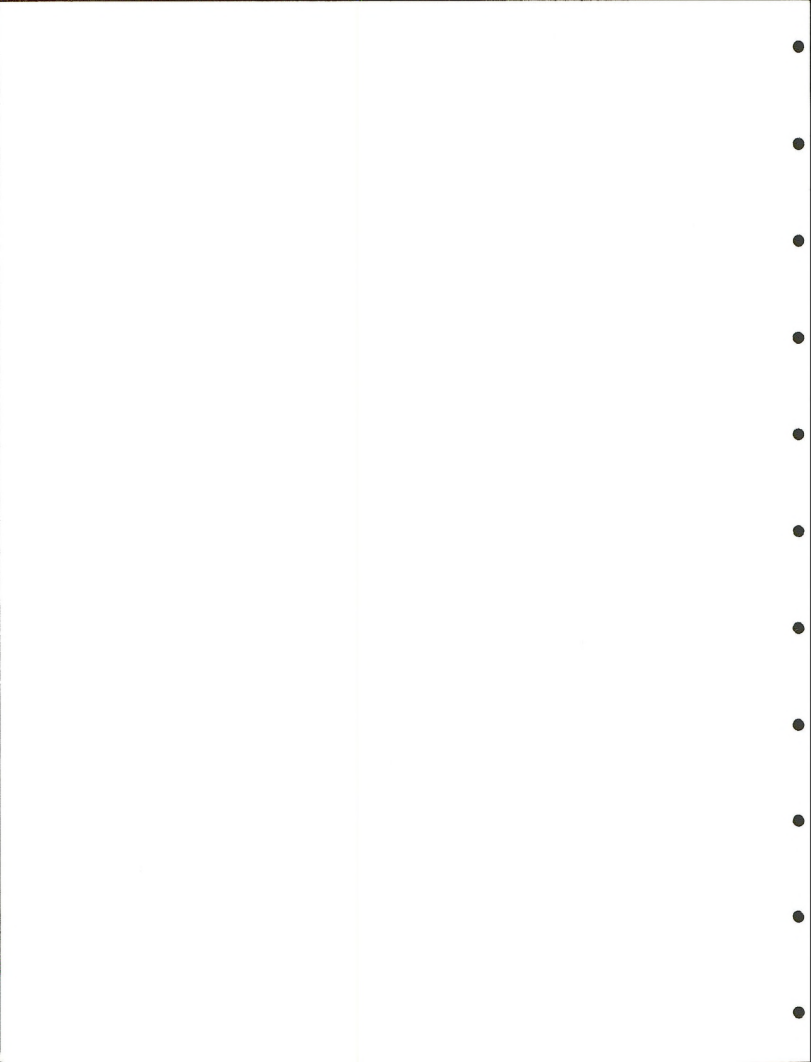
TOPOGRAPHY: Flat in south. Extremely rugged north-south ridges in north portion.

HABITAT: Overgrazed *Schismus*, *Bromus*, and *Atriplex* in flats. Ridges largely undisturbed with varying grass and shrub cover.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Topography too steep to be good potential kit fox habitat. Flats may have marginal potential.



TOWNSHIP RANGE: T10N, R24W

QUADRANGLE: Ballinger Canyon

SECTION NO(s): 18 LAND UNIT: 8 ACREAGE: 480

DATE OF FIELD  
SURVEY: 12 October 1979

FIELD CREW: Kato, McCue, Sauls

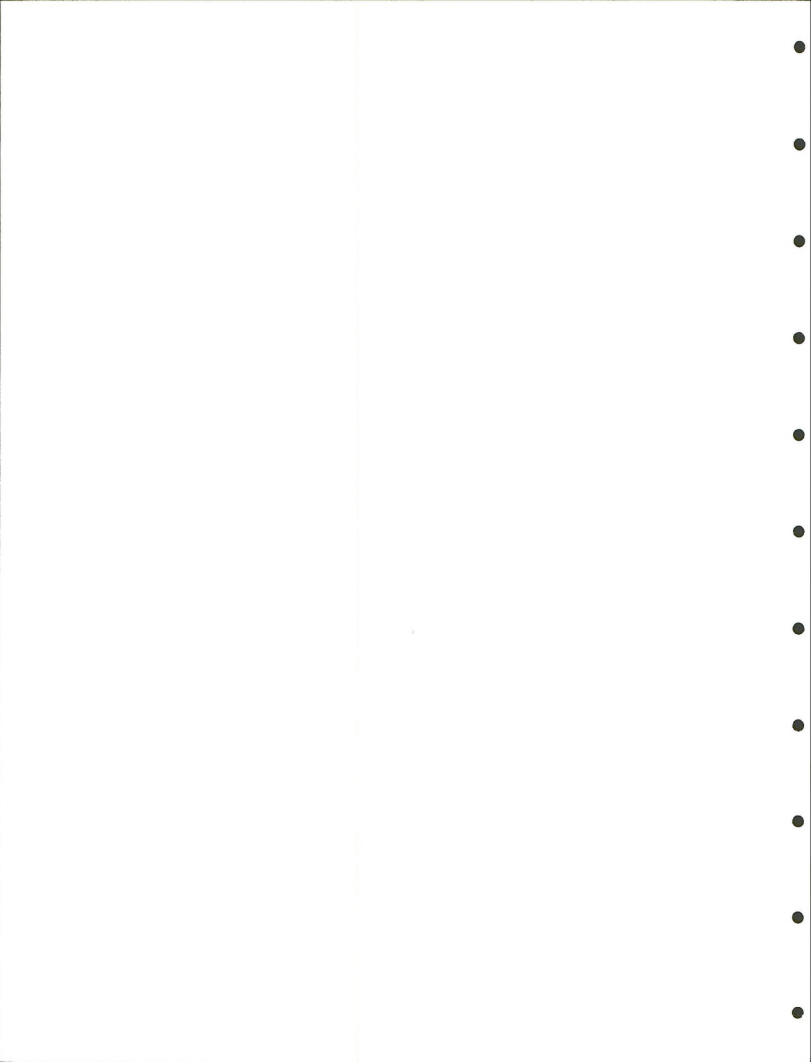
TOPOGRAPHY: Rolling hills in south portion. Steep ridges with hills in northwest. Flat plateau in northeast.

HABITAT: Flats overgrazed *Bromus*, *Schismus*, and *Atriplex*. Ridges largely undisturbed with varying grass and shrub cover.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Topography too rugged to be suitable kit fox habitat. Flats may have marginal potential.





TOWNSHIP RANGE: T10N, R25W

QUADRANGLE: Cuyama

SECTION NO(s): 7                      LAND UNIT: 8                      ACREAGE: ~413

DELETED FROM SURVEY

TOPOGRAPHY:                      Very rugged slopes throughout section.

CONCLUSION:                      Due to the extremely rugged terrain this section was not surveyed. Prior experience in nearby areas in the Cuyama and New Cuyama quadrangles had revealed little or no evidence of kit fox in similar terrain.



TOWNSHIP RANGE: T10N, R26W

QUADRANGLE: Cuyama

SECTION NO(s): 1

LAND UNIT: 8

ACREAGE: ~195

DELETED FROM SURVEY

TOPOGRAPHY: Very rugged slopes throughout section.

CONCLUSION: Due to the rugged terrain, this section was not surveyed. Prior experience in nearby areas in the Cuyama and New Cuyama quadrangles had revealed little or no evidence of kit fox in similar terrain.



TOWNSHIP RANGE: T10N, R26W

QUADRANGLE: Cuyama

SECTION NO(s): 2

LAND UNIT: 8

ACREAGE: ~60

DELETED FROM SURVEY

TOPOGRAPHY: Very rugged slopes throughout section.

CONCLUSION: Due to the rugged terrain, this section was not surveyed. Prior experience in nearby areas in the Cuyama and New Cuyama quadrangles had revealed little or not evidence of kit fox in similar terrain.



TOWNSHIP RANGE: T10N, R26W

QUADRANGLE: New Cuyama

SECTION NO(s): 2

LAND UNIT: 8

ACREAGE: ~161

DELETED FROM SURVEY

TOPOGRAPHY: Mountainous.

CONCLUSION: Due to the rugged terrain, this section was not surveyed. Prior experience in nearby areas in the Cuyama and New Cuyama quadrangles had revealed little or no evidence of kit fox in similar terrain.





TOWNSHIP RANGE: T10-1/2N, 10N, R27W

QUADRANGLE: New Cuyama

SECTION NO(s): 1 and 36

LAND UNIT: 8

ACREAGE: ~340

DELETED FROM SURVEY

TOPOGRAPHY: Very hilly and mountainous.

CONCLUSION: Due to the rugged terrain, this section was not surveyed. Prior experience in nearby areas in the Cuyama and New Cuyama quadrangles had revealed little or no evidence of kit fox in similar terrain.



TOWNSHIP RANGE: T10-1/2N, 10N, R27W

QUADRANGLE: New Cuyamã

SECTION NO(s): 3 and 34

LAND UNIT: 8

ACREAGE: ~176

DELETED FROM SURVEY

TOPOGRAPHY: Hilly to mountainous.

CONCLUSION: Due to the rugged terrain, this section was not surveyed. Prior experience in nearby areas in the Cuyama and New Cuyama quadrangles had revealed little or no evidence of kit fox in similar terrain.



TOWNSHIP RANGE: T10-1/2N, 10N, R27W

QUADRANGLE: Peak Mountain

SECTION NO(s): 3 and 34

LAND UNIT: 8

ACREAGE: ~110

DELETED FROM SURVEY

TOPOGRAPHY: Flat to hilly.

CONCLUSION: Due to the terrain in these two sections, these areas were not surveyed. Prior experience in nearby areas in New Cuyama had revealed little or no evidence of kit fox in similar terrain.



TOWNSHIP RANGE: T11N, R27W

QUADRANGLE: Caliente Mountain

SECTION NO(s): 19

LAND UNIT: 8

ACREAGE: 600

DELETED FROM SURVEY

TOPOGRAPHY: Mountainous.

CONCLUSION: Due to the rugged terrain and inaccessability of this section, it was deleted from the survey. Prior experience in similar terrain had revealed little or no evidence of kit fox.





TOWNSHIP RANGE: T11N, R27W

QUADRANGLE: Caliente Mountain

SECTION NO(s): 29

LAND UNIT: 8

ACREAGE: 336

DELETED FROM SURVEY

TOPOGRAPHY: Mountainous.

CONCLUSION: Due to the rugged terrain and inaccessability of this section, it was deleted from the survey. Prior experience in similar terrain had revealed little or no evidence of kit fox.



TOWNSHIP RANGE: T11N, R27W

QUADRANGLE: Caliente Mountain

SECTION NO(s): 30                      LAND UNIT: 8                      ACREAGE: ~70

DELETED FROM SURVEY

TOPOGRAPHY: Hilly to mountainous.

CONCLUSION: Due to the rugged terrain and inaccessability of this section, it was deleted from the survey. Prior experience in similar terrain had revealed little or no evidence of kit fox.



TOWNSHIP RANGE: T22S, R18E

QUADRANGLE: Kettleman Plain

SECTION NO(s): 28

LAND UNIT: 9

ACREAGE: 640

DATE OF FIELD  
SURVEY:

15 November 1979

FIELD CREW:

Kato, McCue, O'Farrell, Sauls

TOPOGRAPHY:

Rolling hills, becoming more flat in the southern third.

HABITAT:

*Bromus*, *Atriplex*, *Hymenoclea*, and *Eriogonum fasciculatum*. Much grazing apparent. Also, wind carries noxious air pollution from a toxic waste disposal site nearby.

PREY BASE:

	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	0

EVIDENCE OF  
KIT FOX:

	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	4
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	3	Prey remains	0
Inactive multiple (IM)	2		
Active single (AS)	4		
Inactive single (IS)	0		

CONCLUSION:

Potentially good kit fox habitat but evidence of breeding sites is lacking. Major disturbance to this area is sheep grazing which is heavy in some places. Low priority habitat.



TOWNSHIP RANGE: T22S, R18E

QUADRANGLE: La Cima

SECTION NO(s): 8 LAND UNIT: 9 ACREAGE: 640

DATE OF FIELD  
SURVEY: 15 November 1979

FIELD CREW: Kato, McCue, O'Farrell, Sauls

TOPOGRAPHY: Rolling hills, with three major flat areas.

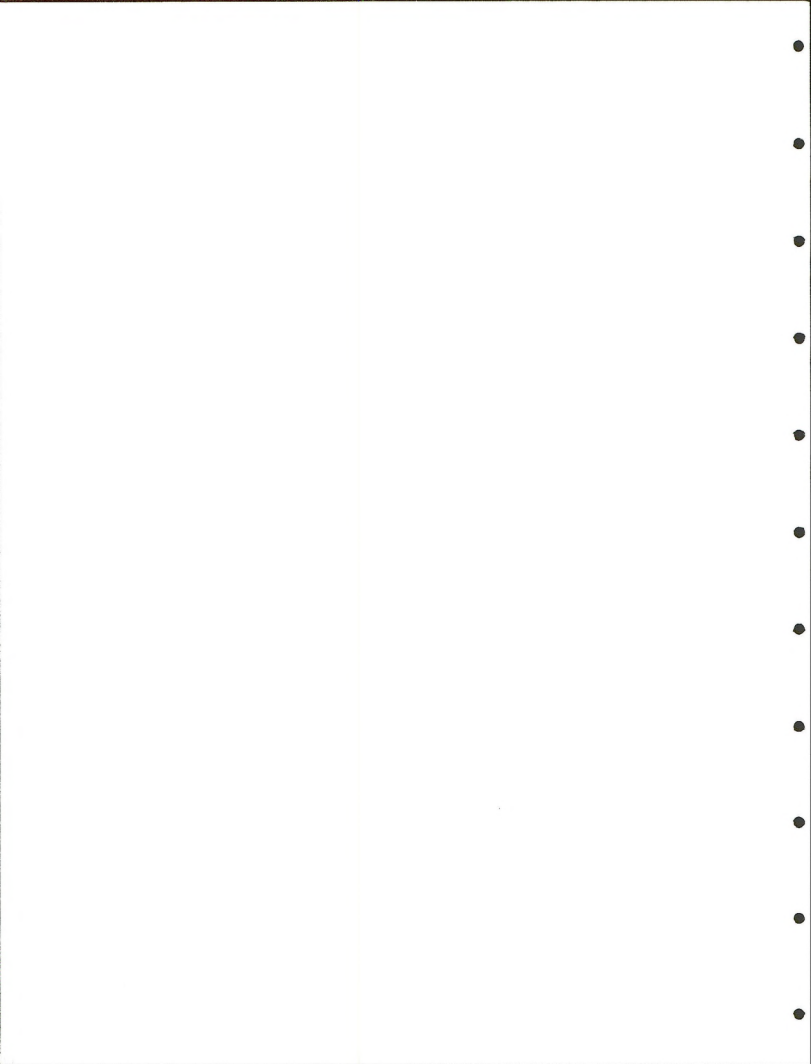
HABITAT: Disturbed area. Rank second growth *Atriplex polycarpa*, *Bromus rubens*, and *Salsola kali*. Very little shrub diversity. Some areas denuded by sheep grazing. Disturbance by oil activity (polluted washes) present.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	3

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	2
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	2	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION: Potentially good kit fox habitat although evidence of kit fox is scarce. Grazing is a major disturbance in this section and is particularly heavy in some areas. Low priority habitat.

RECOMMENDATION: Future activity should be monitored.





TOWNSHIP RANGE: T22S, R18E

QUADRANGLE: La Cima

SECTION NO(s): 6 LAND UNIT: 9 ACREAGE: 640

DATE OF FIELD  
SURVEY: 16 November 1979

FIELD CREW: Kato, McCue, O'Farrell, Sauls

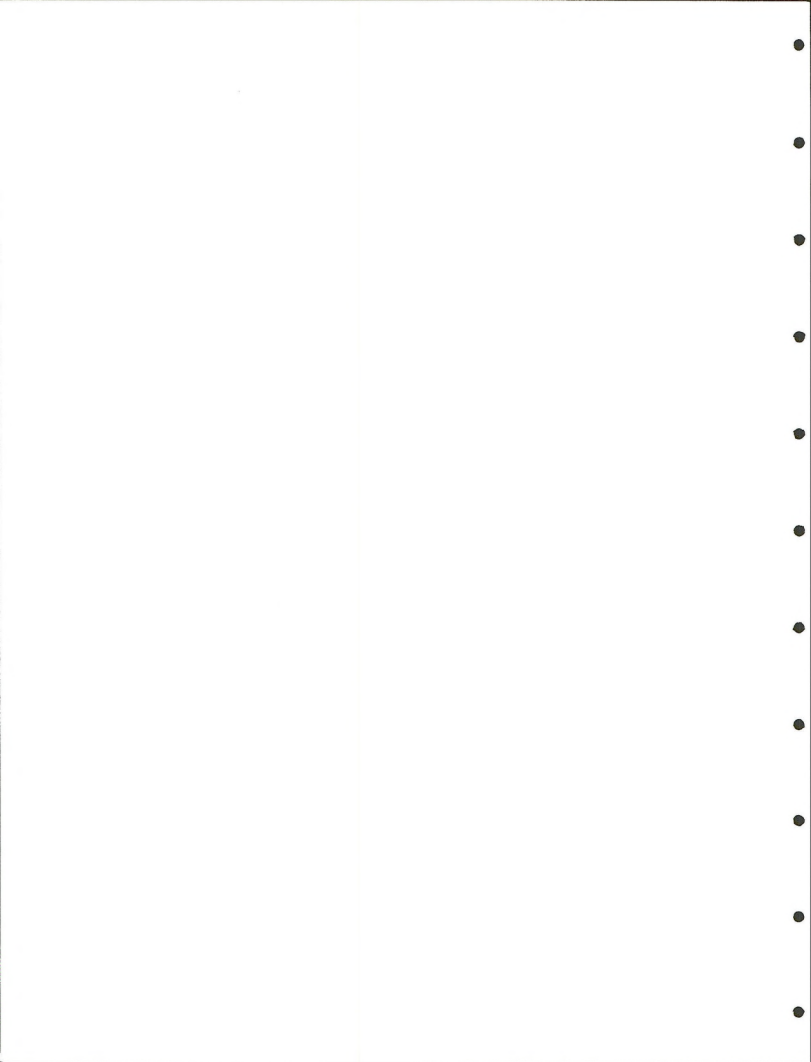
TOPOGRAPHY: Rolling hills, becoming more steep in the northwest quarter.

HABITAT: Fairly undisturbed section except for grazing. Thick grass cover of *Bromus rubens* and *Festuca* sp. Shrubs on slopes, especially rockier areas, *Atriplex*, *Eriogonum fasciculatum*, *Gutierrezia*, and *Hymenoclea*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	4
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	2	Prey remains	1
Inactive multiple (IM)	2		
Active single (AS)	3		
Inactive single (IS)	0		

CONCLUSION: Potentially good kit fox habitat but evidence of breeding sites is lacking. Main disturbance is grazing, which is widespread in some areas.



TOWNSHIP RANGE: T22S, R17E

QUADRANGLE: Avenal

SECTION NO(s): 4 LAND UNIT: 9 ACREAGE: 320

DATE OF FIELD  
SURVEY: 16 November 1979

FIELD CREW: O'Farrell, Sauls

TOPOGRAPHY: Rolling hills near the crest of the Kettleman Hills north dome,  
gentle wide valley floors.

HABITAT: Overgrazed cow pasture, some roads and oil development. *Bromus*  
and *Atriplex polycarpa*. Very little shrub cover.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Due to grazing this would appear to have low potential.

RECOMMENDATION: Grazing by cattle is extreme here and should be controlled, as  
this would appear to be otherwise ideal kit fox habitat.



TOWNSHIP RANGE: T22S, R17E

QUADRANGLE: La Cima

SECTION NO(s): 12

LAND UNIT: 9

ACREAGE: 160

DATE OF FIELD  
SURVEY:

15 November 1979

FIELD CREW:

Kato, Sauls

TOPOGRAPHY:

Rolling hills, becoming more steep towards the west.

HABITAT:

Grass-covered canyon slopes, shrubs on steeper rockier slopes and canyon bottoms. *Bromus*, *Festuca* sp., *Eriogonum fasciculatum*, and *Eastwoodia*. Disturbance includes some grazing, roads, and moderate oil development.

PREY BASE:

Total

*Lepus*  
*Sylvilagus*

1  
2

EVIDENCE OF  
KIT FOX:

Total

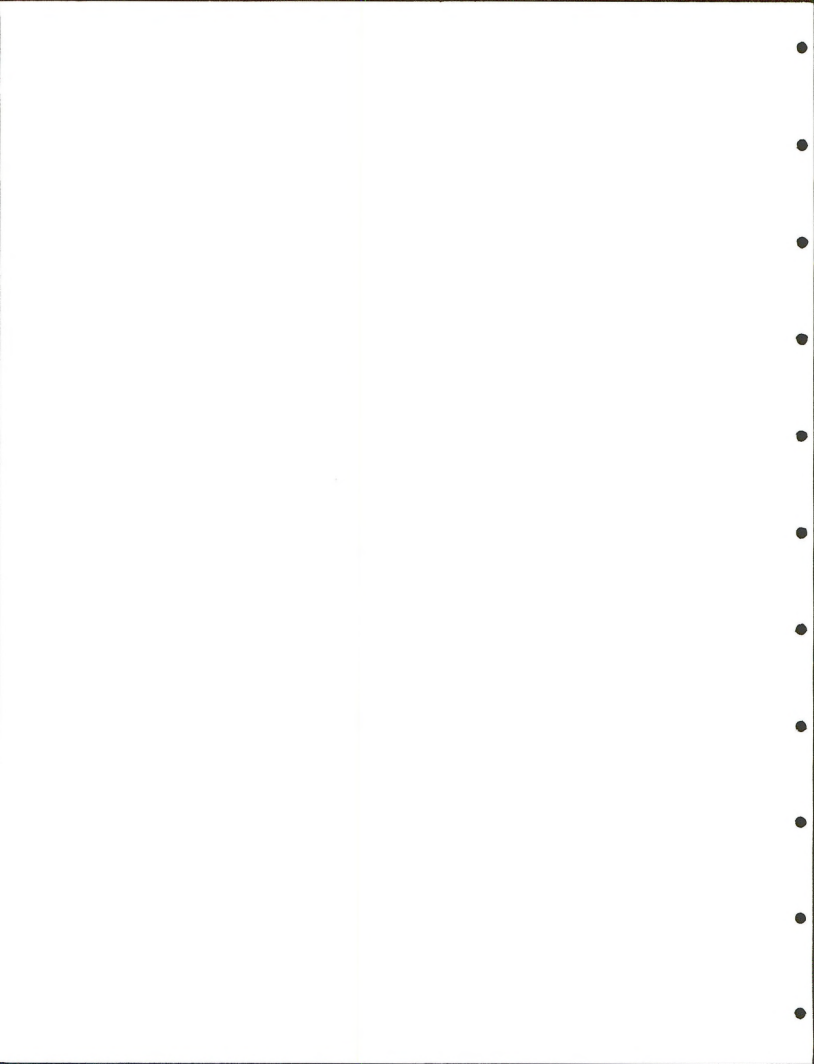
Total

Active natal (AN) 0  
Inactive natal (IN) 0  
Active multiple (AM) 1  
Inactive multiple (IM) 0  
Active single (AS) 2  
Inactive single (IS) 0

Scats 2  
Tracks 0  
Prey remains 0

CONCLUSION:

Marginal potential kit fox habitat. Fairly steep in spots, and small acreage.



TOWNSHIP RANGE: T22S, R18E

QUADRANGLE: Kettleman Plain and La Cima

SECTION NO(s): 20 LAND UNIT: 9 ACREAGE: 640

DATE OF FIELD  
SURVEY: 14 November 1979

FIELD CREW: Kato, McCue, O'Farrell, Sauls

TOPOGRAPHY: Rolling hills, generally more steep in the northern half.

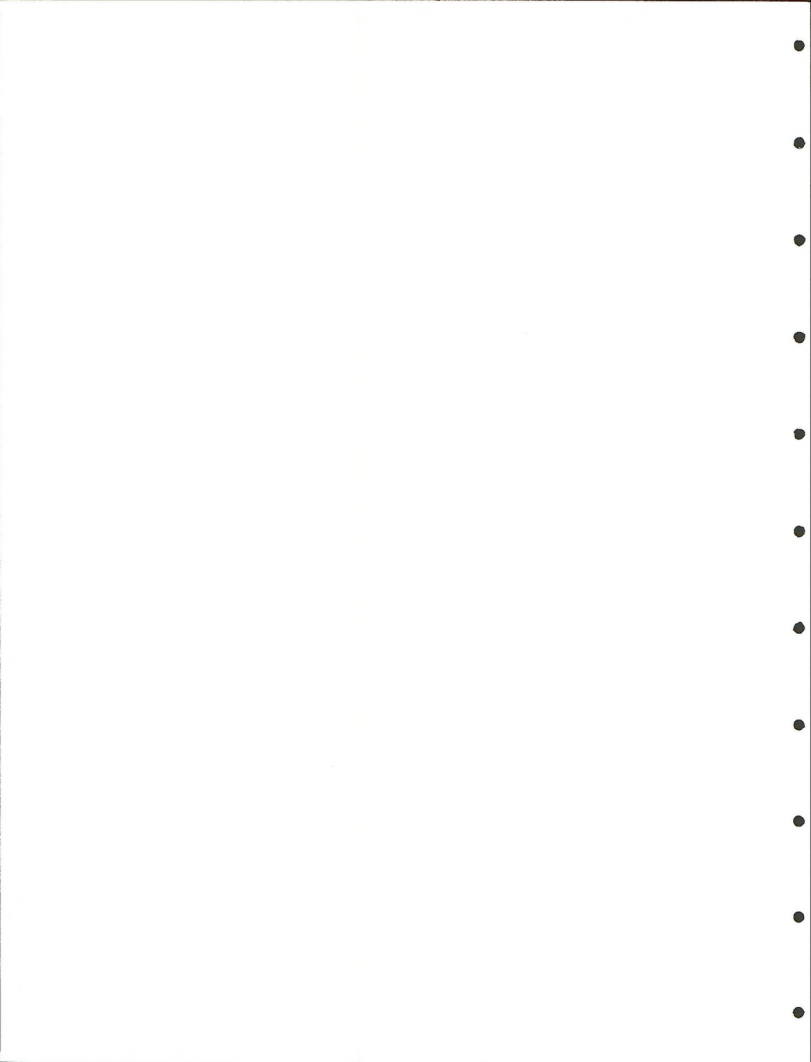
HABITAT: *Bromus rubens* and *Festuca* sp. More shrubs in rockier areas in the northern half, *Atriplex polycarpa*, *Gutierrezia*, and *Eriogonum fasciculatum*. Moderate grazing disturbance.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	3
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	3		
Inactive single (IS)	2		

CONCLUSION: Marginal potential kit fox habitat.

RECOMMENDATION: Further development should be monitored, and grazing controlled.





TOWNSHIP RANGE: T21S, R17E

QUADRANGLE: La Cima and Avenal

SECTION NO(s): 34 LAND UNIT: 9 ACREAGE: 320

DATE OF FIELD  
SURVEY: 16 November 1979

FIELD CREW: Kato, McCue

TOPOGRAPHY: Rolling hills, with shallow canyons running generally north-south.

HABITAT: Western portion grazed. Southern boundary area very disturbed by gas plant. *Bromus* and *Atriplex polycarpa*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	8
<i>Sylvilagus</i>	7

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	0		

CONCLUSION: Potential kit fox habitat.

RECOMMENDATION: Grazing should be controlled and further development monitored.



TOWNSHIP RANGE: T22S, R18E

QUADRANGLE: La Cima

SECTION NO(s): 18 LAND UNIT: 9 ACREAGE: 640

DATE OF FIELD  
SURVEY: 13 November 1979

FIELD CREW: Kato, McCue, O'Farrell, Sauls

TOPOGRAPHY: Steep ridge runs diagonally northwest to southeast through the section. Large wash cuts through southwest portion.

HABITAT: Grass cover variable and extensive grazing apparent, *Bromus rubens* and *Festuca* sp. Shrubs: *Atriplex polycarpa*, *Hymenoclea*, and *Eastwoodia*. Rocky outcrops present.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	1

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	1	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	6		
Inactive single (IS)	1		

CONCLUSION: Prey base low. Low-to-average value as critical habitat, but has potential. Sheep grazing has denuded large areas.

RECOMMENDATION: Grazing should be monitored and avoided until grass cover can be reestablished.



TOWNSHIP RANGE: T22S, R17E

QUADRANGLE: Kettleman Plain

SECTION NO(s): 24 LAND UNIT: 9 ACREAGE: 640

DATE OF FIELD  
SURVEY: 13 November 1979

FIELD CREW: Kato, McCue, O'Farrell, Sauls

TOPOGRAPHY: Rolling hills, with deep wash cuts in the northern half becoming more gentle in the southern half.

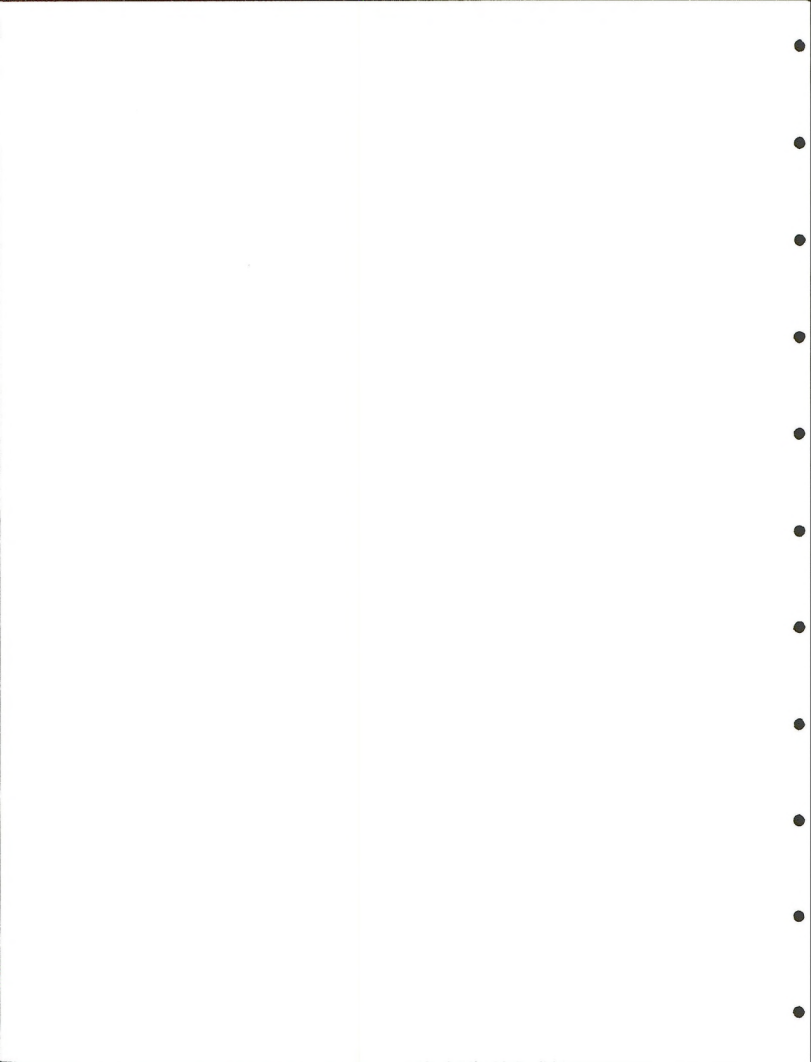
HABITAT: Souther half: *Bromus rubens*, *Salsola kali*, and *Atriplex polycarpa*. Northern half: more diverse shrubs and rockier substrate: *Eriogonum fasciculatum*, *Atriplex polycarpa*, and *Gutierrezia bracteata*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	3
Inactive natal (IN)	0	Tracks	1
Active multiple (AM)	2	Prey remains	1
Inactive multiple (IM)	2		
Active single (AS)	4		
Inactive single (IS)	2		

CONCLUSION: Poor prey base. Low-to-average value as critical habitat.

RECOMMENDATION: Area is potential kit fox habitat, and grazing should be monitored and limited.



TOWNSHIP RANGE: T22S, R18E

QUADRANGLE: Kettleman Plain

SECTION NO(s): 30 LAND UNIT: 9 ACREAGE: 640

DATE OF FIELD SURVEY: 14 November 1979

FIELD CREW: Kato, McCue, O'Farrell, Sauls

TOPOGRAPHY: Rolling hills, with ridges running north-south.

HABITAT: Mostly grass-covered ridges with *Bromus rubens*, *Festuca* sp., and *Lepidium* sp. Shrubs are *Atriplex polycarpa*, *Hymenoclea*, and *Eriogonum fasciculatum*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	6
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	3	Prey remains	0
Inactive multiple (IM)	1		
Active single (AS)	3		
Inactive single (IS)	1		

CONCLUSION: Area is potential kit fox habitat.

RECOMMENDATION: Grazing should be monitored and limited.





TOWNSHIP RANGE: T22S, R17E

QUADRANGLE: La Cima and Avenal

SECTION NO(s): 10 LAND UNIT: 9 ACREAGE: 400

DATE OF FIELD  
SURVEY: 14 November 1979

FIELD CREW: Kato, McCue, O'Farrell, Sauls

TOPOGRAPHY: Rolling hills, with washes and ridges running north-south.

HABITAT: Much disturbance due to motorcycle activity and overgrazing by sheep. *Bromus rubens*, *Festuca* sp., *Bromus mollis*, *Atriplex polycarpa*, and *Salsola*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	2
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	4	Scats	8
Inactive natal (IN)	0	Tracks	2
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	2		
Inactive single (IS)	1		

CONCLUSION: South end is a write-off section.

RECOMMENDATION: Area is potential kit fox habitat, and grazing should be monitored and limited. Due to presence of breeding kit fox, ORV activity should be closely monitored, if not stopped.



TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 27 LAND UNIT: 10 ACREAGE: 480

DATE OF FIELD  
SURVEY: 17 September 1979

FIELD CREW: Kato, McCue, Sauls, Swidler

TOPOGRAPHY: Hills in west and south portions, flat in northeast.

HABITAT: Very disturbed in northeast section. Grass cover: *Bromus*,  
*Plantago* sp., and *Eurotia* understory. Vegetation: *Atriplex*,  
*Hymenoclea*, and *Gutierrezia*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	11
<i>Sylvilagus</i>	12

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	1	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	2		

CONCLUSION: Northeast quarter of this section has been fenced off and bulldozed, with no vegetation remaining. Obviously very poor kit fox habitat. Northwest quarter is also very disturbed by oil development, and is poor quality fox habitat. However, southwest quarter is pasture land, fenced off from the oil fields.

RECOMMENDATION: Southwest quarter is potentially good kit fox habitat and should be treated as such. Further development of oil fields should be monitored, and disturbances kept to a minimum.



TOWNSHIP RANGE: All but SW 1/4

QUADRANGLE: Fellows

SECTION NO(s): 22                      LAND UNIT: 10                      ACREAGE: 480

DATE OF FIELD  
SURVEY: 17 September 1979

FIELD CREW: Cherniss, Dawson, Kato, Sauls

TOPOGRAPHY: Flats and gentle ridges in the north.

HABITAT: Extremely disturbed by wells, roads, and venting gases and processing plants. *Bromus* and *Atriplex polycarpa*, weedy species.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	5
<i>Sylvilagus</i>	10

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Habitat is apparently too disturbed to support any kit fox activity.



TOWNSHIP RANGE: R22E, T31S SW 1/4

QUADRANGLE: Fellows

SECTION NO(s): 25 LAND UNIT: 10 ACREAGE: 160

DATE OF FIELD  
SURVEY: 13 September 1979

FIELD CREW: Cherniss, Dawson

TOPOGRAPHY: Flats.

HABITAT: Very disturbed area of roads and wells. *Bromus* and *Atriplex*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	0
<i>Sylvilagus</i>	0

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Highly disturbed, poor kit fox habitat due to disturbance in past.





TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 23 LAND UNIT: 10 ACREAGE: 160

DATE OF FIELD  
SURVEY: 13 September 1979

FIELD CREW: McCue, Sauls

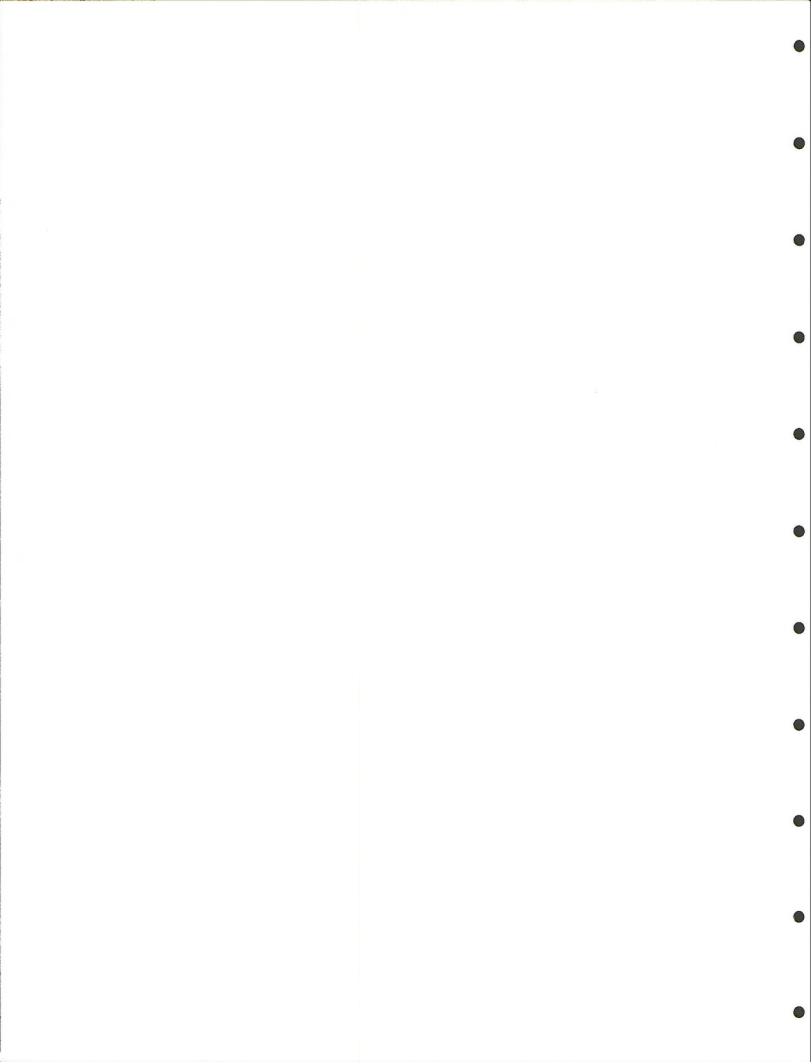
TOPOGRAPHY: Flat

HABITAT: Very disturbed area, with oil development, wells, roads, etc.  
*Atriplex*, *Bromus*, and *Schismus*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	1
<i>Sylvilagus</i>	9

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	1
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	1
Inactive multiple (IM)	0		
Active single (AS)	1		
Inactive single (IS)	0		

CONCLUSION: Area is too far gone for reclamation and too disturbed to be considered good kit fox habitat. However, evidence indicates that the foxes are using the area to some degree, especially the southern end.



TOWNSHIP RANGE: T31S, R22E

QUADRANGLE: Fellows

SECTION NO(s): 35 NE 1/4 LAND UNIT: 10 ACREAGE: 160

DATE OF FIELD SURVEY: 13 September 1979

FIELD CREW: Cherniss, Dawson

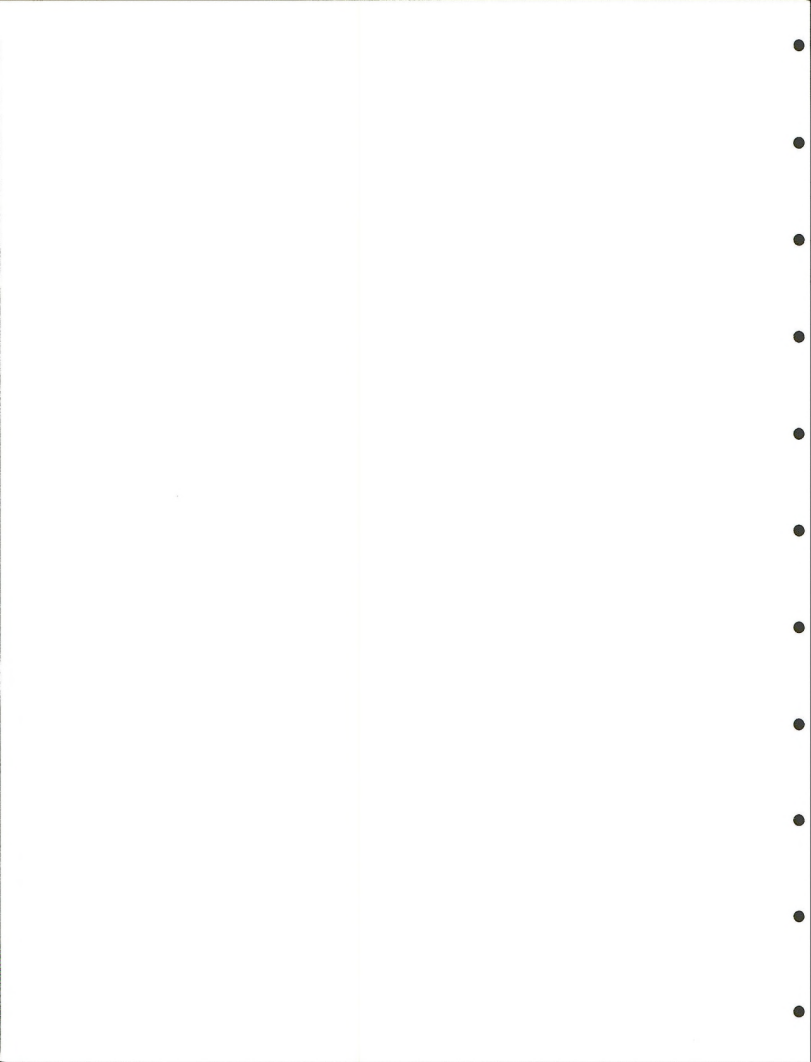
TOPOGRAPHY: Generally flat, hilly in southwest corner.

HABITAT: Highly disturbed area, developed for oil, many wells and roads.  
*Bromus*, *Festuca* sp., scattered *Salsola*; and *Atriplex polycarpa*.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	7
<i>Sylvilagus</i>	5

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	0
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	0		

CONCLUSION: Poor kit fox habitat due primarily to wells, roads, and tanks.



TOWNSHIP RANGE: R22E, T31S SE1/4

QUADRANGLE: Fellows

SECTION NO(s): 21 LAND UNIT: 10 ACREAGE: 160

DATE OF FIELD  
SURVEY: 21 September 1979

FIELD CREW: Dawson, McCue, Sauls

TOPOGRAPHY: Gentle ridges and washes.

HABITAT: Extremely disturbed with roads and wells. *Bromus* sparse.  
*Atriplex polycarpa*, *Salsola*, and other weeds.

PREY BASE:	<u>Total</u>
<i>Lepus</i>	10
<i>Sylvilagus</i>	4

EVIDENCE OF KIT FOX:	<u>Total</u>		<u>Total</u>
Active natal (AN)	0	Scats	0
Inactive natal (IN)	0	Tracks	1
Active multiple (AM)	0	Prey remains	0
Inactive multiple (IM)	0		
Active single (AS)	0		
Inactive single (IS)	1		

CONCLUSION: Habitat too disturbed for foxes.



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## APPENDIX B: KIT FOX DEN ANALYSIS SHEETS OF SIGNIFICANT INFORMATION FOUND WITHIN EACH LAND UNIT

The following data are included:

**CODE.** Each den received an individual code number to facilitate cross-referencing with field notebooks and map references. The code consists of the section number, followed by the transect line number, and den number. Transect lines were number 1 through 8 from west to east or north to south, depending on how the transects were arranged within a land parcel. The den number was the cumulative number of dens found to that point on a specific transect. For example, in the Kettleman Hills Land Unit, Den 6-4-3, indicates that the den was found in Section 6, on the fourth of eight transects numbered from west to east, and the specific den was the third den found on that transect.

**CATEGORY.** Dens were classified using the following abbreviations: AN - active natal den, AM - active multiple-hole den, AS - active single-hole den, IN - inactive natal den, IM - inactive multiple-hole den, IS - inactive single-hole den, AU - active unique den, and IU - inactive unique den. Active dens had positive evidence of use by fox in 1979; inactive dens did not. Natal dens had multiple holes, matted vegetation, and prey remains. Unique dens, such as in culverts, were described when found.

**NUMBER OF HOLES.** The number of holes for each den was counted.

**SLOPE POSITION.** Position of dens on slopes was noted as follows: C - crest of hill, U - upper slope, M - mid-slope, L - lower slope, W - wash bottom, and F - found in the flats away from a slope.

**DEN FACING.** The compass direction (in degrees) faced by the den was determined.

**SLOPE ANGLE.** Slope angles (in degrees) where dens were found were measured with a clinometer.

**ELEVATION.** Presented here in both English and metric units.

**VEGETATION DOMINANTS.** The dominant ground cover and shrubs associated with individual den sites were noted using the following species key: Atpo - *Atriplex polycarpa*, Atsp - *Atriplex spinifera*, BrRu - *Bromus rubens*, Ceme - *Centaurea melitensis*, Eula - *Ceratoides (Eurotia) lanata*, Eael - *Eastwoodia elegans*, Epca - *Ephedra californica*, Erse - *Eremocarpus setigerus*, Erfa - *Eriogonum fasciculatum*, Fesp - *Festuca* sp., GuBr - *Gutierrezia bracteata*, Haac - *Haplopappus acradenius*, Hali - *Haplopappus linearifolius*, Hysa - *Hymenoclea salsola*, Isar - *Icomeris arborea*, Lesp - *Lepidium* sp., Saka - *Salsola kali*, and Scar - *Schismus arabicus*.

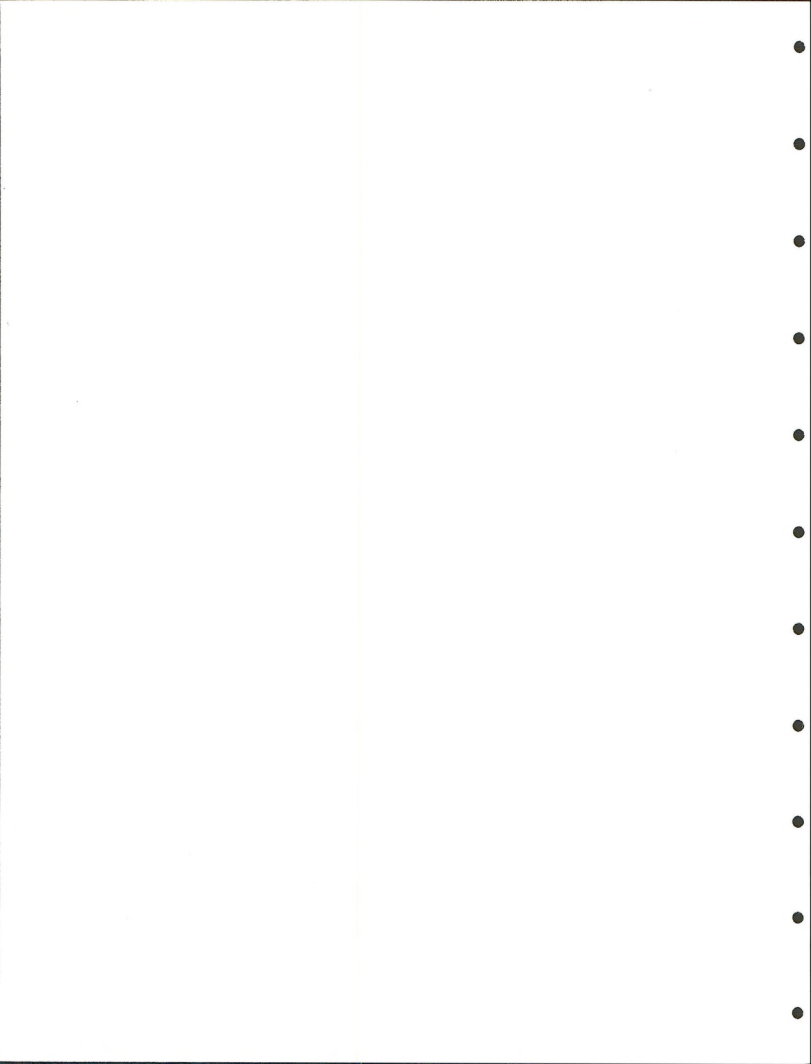
**ANIMAL SIGNS.** Where observed at a den, the following types of information were noted with a plus (+): fox scats, fox tracks, fox prey remains, vegetation matted by fox (particularly pups), presence of owls (slices, pellets,



prey), other mammals (observed, tracks, scats), and dirt berms due to animal digging. The following abbreviations were used in the Other Animals category: BO - burrowing owl, CY - coyote, RA - rabbit, GS - ground squirrel, BA - badger, and UR - unidentified rodent.

HUMAN ACTIVITIES. The types and degrees of human activities proximate to the den site were summarized. The following abbreviations indicate human activities: UD - undisturbed, D - disturbed, HD - highly disturbed, G - grazing, LG - light grazing, HG - heavy grazing, R - road, DR - dirt road, HWY - highway, GR - graded, OW - oil well, TS - tank settings, and ORV - off-road vehicles.

Den analysis sheets in this Appendix are presented for individual land units. Within land units the den analyses are arranged by section, transect number, and den order within individual transects.



LAND UNIT 1. CHICO MARTINEZ CREEK

Den Code Number	1,12-1-1	1,12-2-2	3-4-1	3-4-2	3-4-3	3-7-1	3-8-1	3-8-2
Township Range	T29S, R20E	-----	-----	-----	-----	-----	-----	-----
<u>Category</u>	AM	AS	AN	AS	AM	IM	IS	IS
<u>Number of Holes</u>	7	1	6	1	2	3	1	1
<u>Slope Position</u>	W	M	W	W	L	M	W	L
<u>Den Facing</u>	0°	298°	180°	90°	360°	90°	90°	90°
<u>Slope Angle</u>	4°	8°	90°	70°	90°	25°	30°	30°
<u>Elevation</u>	1200 ft 369 m	1360 ft 418 m	1200 ft 369 m	1200 ft 369 m	1140 ft 351 m	1190 ft 366 m	1080 ft 332 m	1080 ft 332 m
<u>Vegetation Dominants</u>	Brru Atpo	Brru	Brru Fesp	Brru	Brru	Brru	Brru	Brru
<u>Animal Signs</u>								
Fox Scats			+					
Fox Tracks								
Prey Remains			+					
Matted Vegetation		+	+					
Other Animals			BO, UR				BO	BO, CY
Dirt Berms	+	+	+	+	+	+	+	+
<u>Human Activities</u>	G	G	DR LG	LG	LG	UD	UD	UD



LAND UNIT 1. CHICO MARTINEZ CREEK (continued)

Den Code Number	3-8-3	3-8-4	3-8-5	11-3-1	11-5-1	11-7-1
Township Range	T29S, R20E — — — — —					
<u>Category</u>	IS	AS	AS	AS	AS	IM
<u>Number of Holes</u>	1	1	1	1	1	3
<u>Slope Position</u>	M	M	W	M	M	M
<u>Den Facing</u>	90°	90°	90°	120°	0°	360°
<u>Slope Angle</u>	30°	30°	25°	20°	25°	20°
<u>Elevation</u>	1080 ft 332 m	1080 ft 332 m	1060 ft 326 m	1360 ft 418 m	1440 ft 443 m	1320 ft 406 m
<u>Vegetation Dominants</u>	Brru	Brru	Brru	Brru	Brru Hysa	Brru Atpo
<u>Animal Signs</u>						
Fox Scats						
Fox Tracks						
Prey Remains						
Matted Vegetation						
Other Animals		BO		BO		
Dirt Berms	+	+	+	+	+	+
<u>Human Activities</u>	UD	UD	UD	D G	G	G





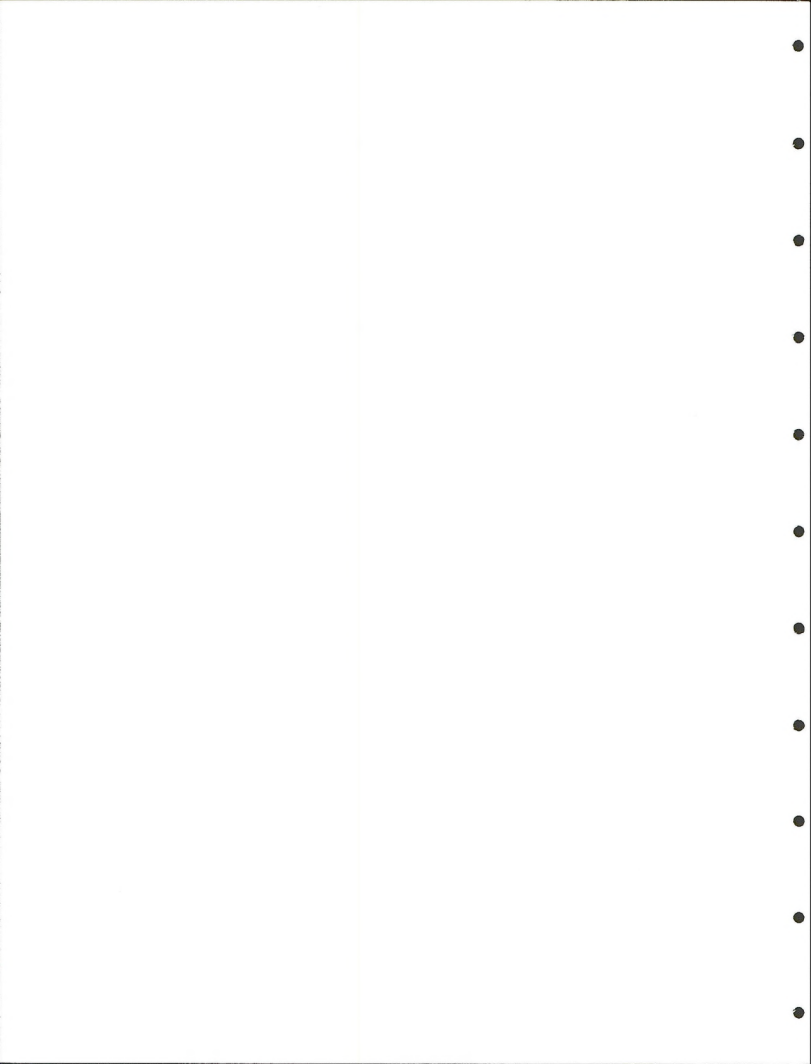
LAND UNIT 2. FRAZER VALLEY

Den Code Number	2-1-1	2-1-2	2-2-1	2-2-2	2-2-3	2-4-1	3-1-1	3-1-2
Township Range	T30S, R21E — — — — — — — —							
<u>Category</u>	IS	AM	IS	AS	IS	AS	IM	IS
<u>Number of Holes</u>	1	2	1	1	1	1	3	1
<u>Slope Position</u>	M	M	M	M	M	M	W	- F
<u>Den Facing</u>	15°	120°	50°	55°	0°	90°	300°	90°
<u>Slope Angle</u>	10°	25°	20°	25°	18°	4°	Bank	0°
<u>Elevation</u>	1010 ft 311 m	1175 ft 362 m	1150 ft 353 m	1110 ft 341 m	1010 ft 331 m	950 ft 292 m	1100 ft 338 m	1050 ft 323 m
<u>Vegetation Dominants</u>	Brru Atsp	Atpo	Atsp Brru	Atsp Brru	Brru	Brru Atpo	Atpo	Brru Atpo
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation				+		+		
Other Animals								BO
Dirt Berms	+	+			+		+	+
<u>Human Activities</u>	HD	UD	UD	UD	UD	DR	UD	UD



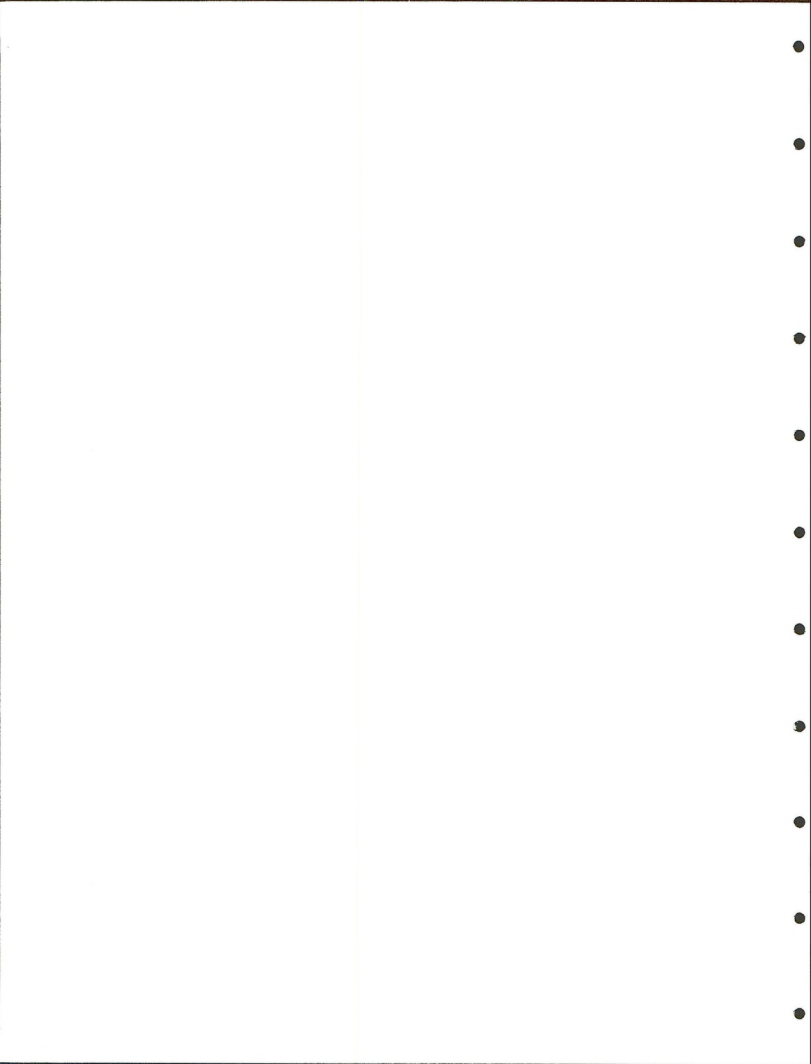
LAND UNIT 2. FRAZER VALLEY (continued)

Den Code Number	3-2-1	3,4-4-1	3,4-4-2	3,4-4-3	9,10-2-1	9,10-2-2	9,10-2-3	9-3-1
Township Range	T30S, R21E	—	—	—	—	—	—	—
<u>Category</u>	IS	AS	AS	AM	IS	AS	AS	IS
<u>Number of Holes</u>	1	1	1	2	1	1	1	1
<u>Slope Position</u>	NA	W	M	W	U	L	L	L
<u>Den Facing</u>	270°	90°	40°	0°	60°	90°	290°	270°
<u>Slope Angle</u>	10°	24°	16°	12°	26°	32°	30°	30°
<u>Elevation</u>	1150 ft 353 m	1650 ft 508 m	1500 ft 462 m	1350 ft 415 m	1850 ft 569 m	1850 ft 569 m	1900 ft 585 m	1800 ft 554 m
<u>Vegetation Dominants</u>	Atsp Brru	Brru Scar	Brru Scar	Brru Atpo Eael	Brru Fesp Eael	Brru Eael	Brru Eael	Brru Atpo
<u>Animal Signs</u>								
Fox Scats			?					
Fox Tracks								
Prey Remains								
Matted Vegetation		+		+	+	+	+	
Other Animals			BO					
Dirt Berms	+	+	+	+		+		+
<u>Human Activities</u>	UD	UD	UD	UD	DR	DR	DR	UD



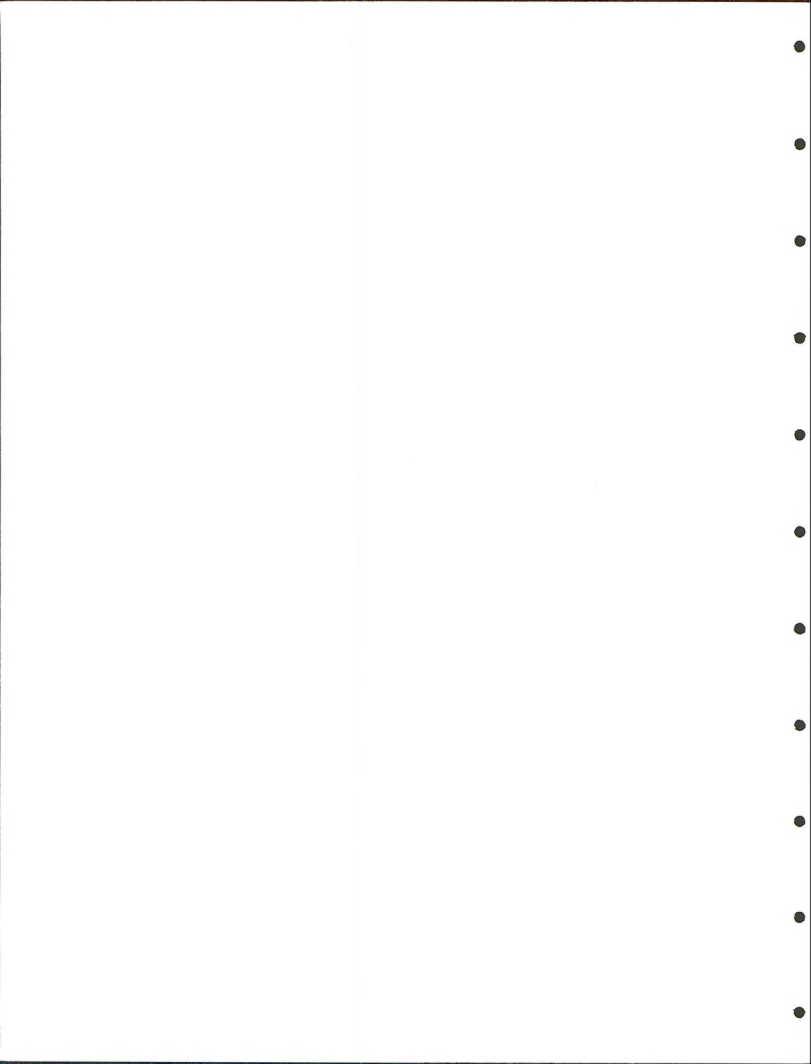
LAND UNIT 2. FRAZER VALLEY (continued)

Den Code Number	9-4-1	10-4-1
Township Range	T30S, R21E — — —	
<u>Category</u>	IS	AS
<u>Number of Holes</u>	1	1
<u>Slope Position</u>	NA	L
<u>Den Facing</u>	180°	150°
<u>Slope Angle</u>	10°	15°
<u>Elevation</u>	2100 ft 646 m	1550 ft 477 m
<u>Vegetation Dominants</u>	Brru	Brru Atpo
<u>Animal Signs</u>		
Fox Scats		
Fox Tracks		
Prey Remains		
Matted Vegetation		
Other Animals	BO	
Dirt Berms	+	+
<u>Human Activities</u>	UD	UD



LAND UNIT 3. BUENA VISTA VALLEY

Den Code Number	2-1-1	2-2-1	2-2-2	2-4-1	2-5-1	2-6-1	2-8-1	4-4-1
Township Range	T30S, R22E — — — — — — — —							
<u>Category</u>	AM	IS	AM	AN	AM	AS	AM	AS
<u>Number of Holes</u>	2	1	2	5	3	1	2	1
<u>Slope Position</u>	NA	W	W	L	W	W	C	F
<u>Den Facing</u>	NA	NA	NA	320°	220°	270°	312°	165°
<u>Slope Angle</u>	0°	0°	0°	3°	23°	30°	0°	0°
<u>Elevation</u>	NA	NA	NA	686 ft 211 m	625 ft 192 m	600 ft 188 m	575 ft 203 m	640 ft 197 m
<u>Vegetation Dominants</u>	Atpo Brru	Atpo Hysa Brru Scar	Sparse Atpo Scar	Brru Atpo	Brru Atpo Hysa	Atpo Brru	Brru Atpo	Brru Scar
<u>Animal Signs</u>								
Fox Scats				+				
Fox Tracks								
Prey Remains								
Matted Vegetation		+	+	+			NA	
Other Animals	BO, UR		BO, UR	BO		GS	GS	
Dirt Berms	+		+	+		+	+	+
<u>Human Activities</u>	UD	UD	UD	UD	NA	NA	UD	UD





LAND UNIT 3. BUENA VISTA VALLEY (continued)

Den Code Number	4-5-1	4-6-1	10-2-1	10-8-1	22-2-1	22-3-1	22-5-1	22-7-1
Township Range	T30S, R22E — — — — — — — —							
<u>Category</u>	AM	AS	AS	AM	AM	AS	AM	AS
<u>Number of Holes</u>	3	1	1	2	4	1	4	1
<u>Slope Position</u>	W	W	W	W	F	L	M	U
<u>Den Facing</u>	NA	NA	85°	90°	180°	0°	90° 270°	0°
<u>Slope Angle</u>	0°	0°	0°	NA	3°	NA	90° 10°	5°
<u>Elevation</u>	NA	NA	810 ft 249 m	700 ft 215 m	960 ft 295 m	925 ft 285 m	925 ft 285 m	980 ft 302 m
<u>Vegetation Dominants</u>	Brru Scar Atpo	Atpo Brru Scar	Brru Scar Atpo	Atpo	Brru Scar	Brru	Brru Atpo	Brru Atpo Erse
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation							+	NA
Other Animals				+			BO, RA	RA
Dirt Berms	+	+					+	+
<u>Human Activities</u>	UD	UD	R	R	UD		UD	OW



LAND UNIT 3. BUENA VISTA VALLEY (continued)

Den Code Number	26-2-1	26-3/4-1	26-3/4-1	26-4-1	26-5-1	26-5-2	2-2-1	12-1-1
Township Range	T30S, R22E — — — — —					T31S, R22E — —		
<u>Category</u>	AM	AM	IS	AS	AM	AS	AN	AM
<u>Number of Holes</u>	11	2	1	1	5	1	8	3
<u>Slope Position</u>	C	NA	W	W	W	W	U	L
<u>Den Facing</u>	90°	0°	0°	0°	70°	90°	0°	360°
<u>Slope Angle</u>	flats/bank	NA	0°	0°	80°	10°	35°	5°
<u>Elevation</u>	1000 ft 308 m	990 ft 304 m	935 ft 288 m	990 ft 304 m	1000 ft 308 m	1000 ft 308 m	1400 ft 431 m	1200 ft 369 m
<u>Vegetation Dominants</u>	Brru Atpo Scar	Brru Atpo Erse	Brru Erse Atpo Gubr	Brru Erse Atpo Gubr	Atpo Brru Scar Gubr	Brru Atpo Gubr	Brru Scar	Brru Scar
<u>Animal Signs</u>								
Fox Scats					+		+	
Fox Tracks	+							+
Prey Remains							+	
Matted Vegetation	+		NA	NA	+	+	+	+
Other Animals	BO, RA			RA	BO, RA		+	
Dirt Berms	+	+			+	+	+	+
<u>Human Activities</u>	R OW	OW TS	OW TS	NA	R OW	R OW	NA	UD



LAND UNIT 3. BUENA VISTA VALLEY (continued)

Den Code Number	12-2-1	6-1-1	6-2-1	6-2-2	6-3-1	6-4-1	6-4-2	6-5-1
Township Range	T31S, R22E	T31S, R23E	—	—	—	—	—	—
<u>Category</u>	IM	AS	AS	IS	IM	AS	IN	AS
<u>Number of Holes</u>	4	1	1	1	2	1	6	1
<u>Slope Position</u>	W	C	L	M	U	M	L	L
<u>Den Facing</u>	NA	NA	NA	NA	180°	120°	90°	180°
<u>Slope Angle</u>	0°	NA	NA	NA	10°	10°	10°	
<u>Elevation</u>	NA	NA	NA	NA	1125 ft 346 m	1100 ft 338 m	1075 ft 331 m	1075 ft 331 m
<u>Vegetation Dominants</u>	Atpo Brru	Atpo Brru	Atpo Brru	Atpo Brru	Brru Atpo Atsp	Brru Atsp Scar	Brru Atpo	Brru
<u>Animal Signs</u>								
Fox Scats			+					+
Fox Tracks		+						+
Prey Remains								+
Matted Vegetation	+	+	+					+
Other Animals			BO, RA					
Dirt Berms		+		+		+		+
<u>Human Activities</u>	OW TS R	UD	UD	UD	UD	R	UD	NA



LAND UNIT 3. BUENA VISTA VALLEY (continued)

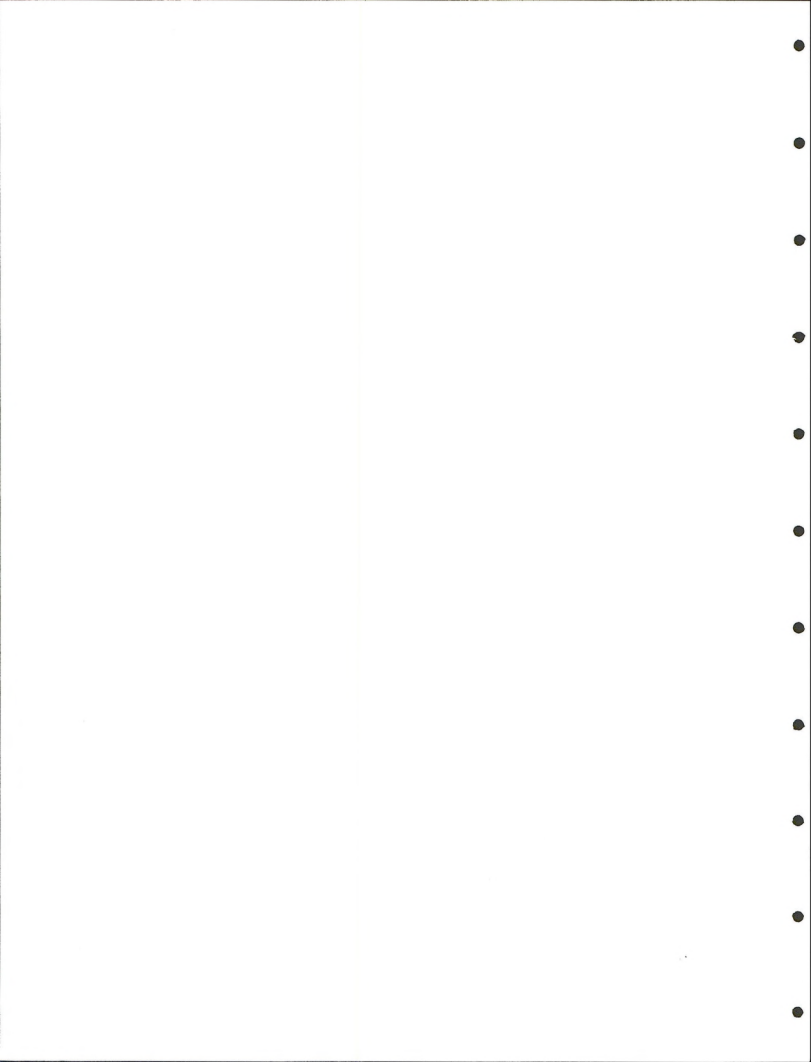
Den Code Number	6-6-1	6-6-2	6-7-1	6-7-2	6-8-1	6-8-2	24-3-1	24-3-2
Township Range	T31S, R23E							
<u>Category</u>	IS	AM	AS	IM	AM	AS	AN	AS
<u>Number of Holes</u>	1	2	1	3	4	1	8	1
<u>Slope Position</u>	L	L	L	M	M	L	L	L
<u>Den Facing</u>		180°	120°	180°	180°	270°	30°	25°
<u>Slope Angle</u>			30°	40°	7°	10°	20°	NA
<u>Elevation</u>	1050 ft 323 m	1075 ft 331 m	1100 ft 339 m	1075 ft 331 m	1060 ft 326 m	1150 ft 354 m	775 ft 238 m	800 ft 246 m
<u>Vegetation Dominants</u>	Brru	Brru	Brru Atpo Atsp	Brru Atsp	Brru Lesp Scar Atpo	Brru Atpo Hysa	Isar Brru	Isar Hysa Brru
<u>Animal Signs</u>								
Fox Scats						+	+	
Fox Tracks								
Prey Remains							+	
Matted Vegetation					+	NA	+	
Other Animals								
Dirt Berms	+		+			+	+	
<u>Human Activities</u>	NA	NA	UD	UD	UD	UD	UD	





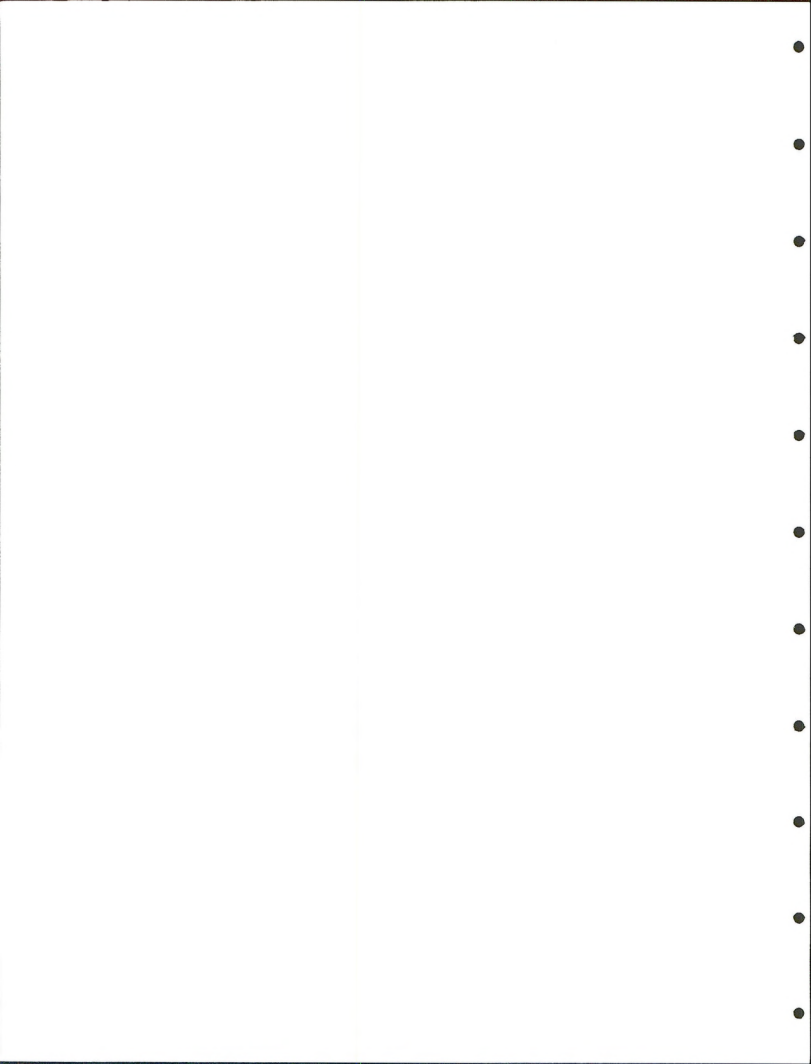
LAND UNIT 3. BUENA VISTA VALLEY (continued)

Den Code Number	24-3-3	24-3-4	24-3-5	24-4-1	24-4-1	24-7-1	24-7-2	24-8-1
Township Range	T31S, R23E — — — — — — — —							
<u>Category</u>	AN	AN	IM	IS	AM	AS	IM	IN
<u>Number of Holes</u>	2	3	3	1	3	1	4	12
<u>Slope Position</u>	F	L	F	F	W	W	F	W
<u>Den Facing</u>	90°	45°	NA	NA	NA	0°	180°	144°
<u>Slope Angle</u>	0°	2°	NA	0°	0°	0°	0°	0°
<u>Elevation</u>	725 ft 223 m	725 ft 223 m	720 ft 221 m	620 ft 191 m	NA	NA	NA	675 ft 208 m
<u>Vegetation Dominants</u>	Brru Scar Erse	Isar Scar	Scar Isar	Isar Hysa Brru	Isar Hysa Scar Brru	Atpo	NA	Brru Atpo
<u>Animal Signs</u>								
Fox Scats	+	+						+
Fox Tracks								
Prey Remains	+	+						+
Matted Vegetation					+			
Other Animals	+							RA
Dirt Berms	+	+				+		
<u>Human Activities</u>	UD	R	R	OW	UD	UD	NA	UD



LAND UNIT 3. BUENA VISTA VALLEY (continued)

Den Code Number	20-1-1	20-3-1
Township Range	T31S, R24E — — —	
<u>Category</u>	IS	IS
<u>Number of Holes</u>	1	1
<u>Slope Position</u>	W	L
<u>Den Facing</u>	38°	200°
<u>Slope Angle</u>	0°	11°
<u>Elevation</u>	NA	NA
<u>Vegetation Dominants</u>	Scar	Brru Scar Atpo
<u>Animal Signs</u>		
Fox Scats		
Fox Tracks		
Prey Remains		
Matted Vegetation	NA	
Other Animals		BA
Dirt Berms		
<u>Human Activities</u>	NA	UD



LAND UNIT 4. TELEPHONE HILLS

Den Code Number	30-4-1	30-4-2	32-1-2	4-7-1	4-7-2	4-8-1	4-8-2	4-8-4
Township Range	T30S, R22E — — — — — T31, R22E — — — — —							
<u>Category</u>	AM	AS	AS	?	?	AM	AS	AS
<u>Number of Holes</u>	2	1	1	3	5	2	1	1
<u>Slope Position</u>	M	W	F	NA	NA	U	L	M
<u>Den Facing</u>	90°	40°	135°	NA	NA	NA	NA	NA
<u>Slope Angle</u>	28°	8°	0°	NA	NA	NA	NA	NA
<u>Elevation</u>	1550 ft 477 m	1650 ft 508 m	640 ft 197 m	NA	NA	NA	NA	NA
<u>Vegetation Dominants</u>	Brru Scar Atpo	Brru Scar	Brru Atpo	Atpo Brru Fesp	Atpo Brru Fesp	Atpo Brru	Brru Fesp	Eael Atpo Brru
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								+
Matted Vegetation	+	+	+			+		+
Other Animals	BO							
Dirt Berms	+	+				+		
<u>Human Activities</u>	OW R	UD	DR	NA	NA	UD	UD	UD



LAND UNIT 4. TELEPHONE HILLS (continued)

Den Code Number	7-1-1	7-1-2	7-3-1	7-3-2	7-4-1	7-4-2	7-4-3	7-4-4
Township Range	T31S, R22E — — — — — — — —							
<u>Category</u>	AS	IM	AN	AS	IM	AM	AS	AM
<u>Number of Holes</u>	1	~36	2	1	4	4	1	4
<u>Slope Position</u>	M	M	M	W	L	L	W	- W
<u>Den Facing</u>	216°	180°	141°	90°	90°	90°	90°	75°
<u>Slope Angle</u>	10°	10°	40°	90°	10°	15°	90°	85°
<u>Elevation</u>	2300 ft 708 m	2300 ft 708 m	2175 ft 669 m	2050 ft 631 m	2000 ft 615 m	2000 ft 615 m	2000 ft 615 m	2000 ft 615 m
<u>Vegetation Dominants</u>	Brru Atsp	Brru Atsp	Brru Atsp	Brru	Brru	Brru	Brru	Brru
<u>Animal Signs</u>								
Fox Scats		+	+					
Fox Tracks								
Prey Remains			+				+	
Matted Vegetation	+	+	+					+
Other Animals		GS	BO			UR		CY
Dirt Berms		+	+	+		+	+	+
<u>Human Activities</u>	G DR	G	DR G	LG	UD	UD	UD	UD





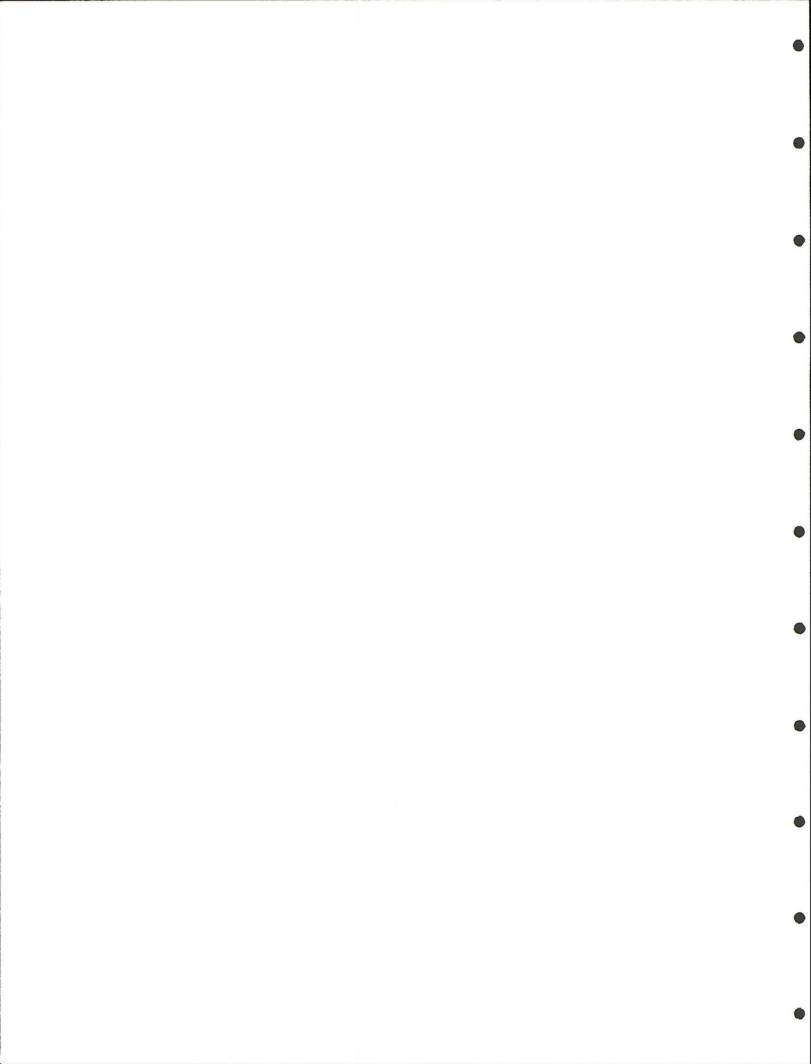
LAND UNIT 4. TELEPHONE HILLS (continued)

Den Code Number	7-4-5	9-1-1	9-7-1	9-8-1	9-8-2
Township Range	T31S, R22E	—	—	—	—
<u>Category</u>	AS	AS	IS	AS	IM
<u>Number of Holes</u>	1	1	1	1	4
<u>Slope Position</u>	W	M	M	L	C bank
<u>Den Facing</u>	90°	78°	204°	332°	187°
<u>Slope Angle</u>	90° bank	26°	30°	90°	90°
<u>Elevation</u>	2000 ft 615 m	1675 ft 575 m	1650 ft 508 m	1480 ft 455 m	1550 ft 477 m
<u>Vegetation Dominants</u>	Brru	Brru Atpo	Brru Atpo	Brru Atpo	Brru Atpo
<u>Animal Signs</u>					
Fox Scats	+			+	
Fox Tracks				+	
Prey Remains				+	
Matted Vegetation		NA	+		
Other Animals			UR		RA, BO
Dirt Berms	+	+	UR		
<u>Human Activities</u>	UD	UD	UD	R OW	OW



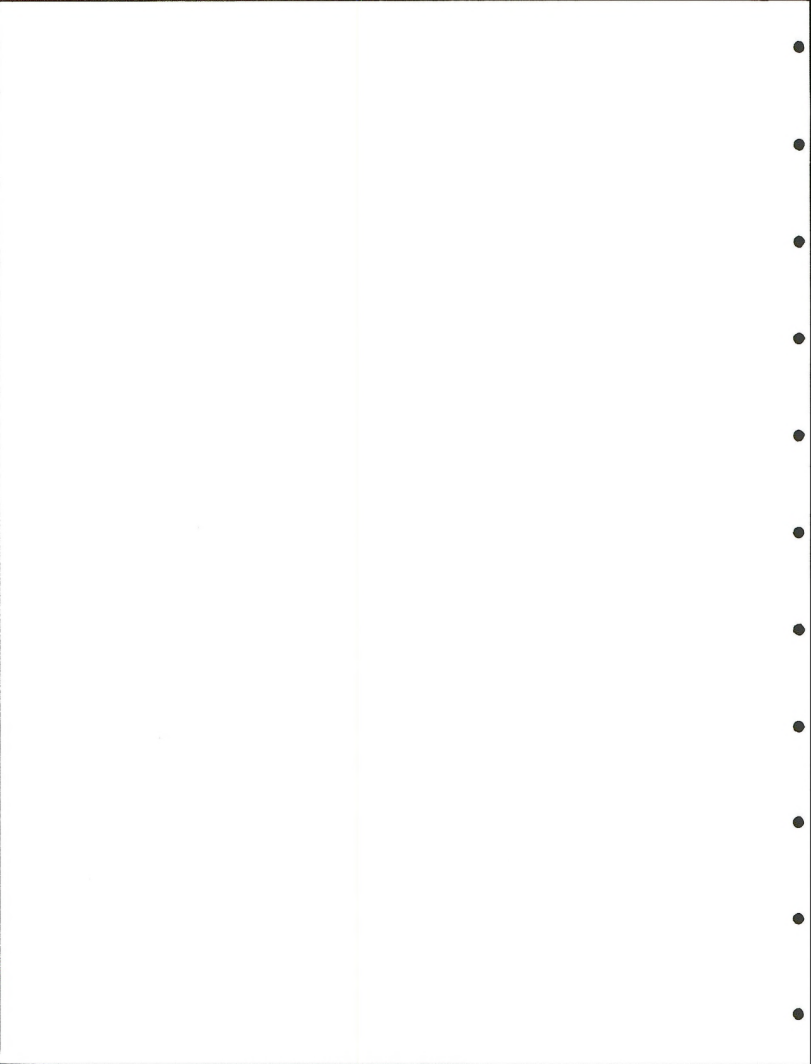
LAND UNIT 5. MIDWAY VALLEY

Den Code Number	5-1-1	9-2-1	9-4-1	9-5-1	9-5-2	9-6-1	24-2-1	24-3-1
Township Range	T31S, R22E — — — — — — — —							
<u>Category</u>	AS	IN	IM	IM	AM	AS	AS	AS
<u>Number of Holes</u>	1	18	4	4	3	1	1	1
<u>Slope Position</u>	man made earth wall	F	L	C	M	M	W	NA
<u>Den Facing</u>	120°	all directions	320°	90°	40°	90°	214°	180°
<u>Slope Angle</u>	30°	0°	10°	5°	10°	25°	5°	NA
<u>Elevation</u>	1250 ft 385 m	1140 ft 351 m	1475 ft 454 m	1650 ft 508 m	1625 ft 500 m	1650 ft 508 m	1250 ft 385 m	1240 ft 382 m
<u>Vegetation Dominants</u>	Brru Atpo	Brru Scar Atpo	Brru Atpo	Brru Atpo	Brru Scar		Brru Atpo	Brru Ceme
<u>Animal Signs</u>								
Fox Scats							+	
Fox Tracks								
Prey Remains								
Matted Vegetation		+				+	+	
Other Animals	RA		CY				UR	+
Dirt Berms						+	+	+
<u>Human Activities</u>	R G	R TS					R OW	GD



LAND UNIT 5. MIDWAY VALLEY (continued)

Den Code Number	24-5-1	24-6-1	24-6-2	24-6-3	24-7-1	32-2-1	32-2-2	10-8-1
Township Range	T31S, R22E — — — — — — —							T32S, R23E
<u>Category</u>	AM	AS	AM	AM	IS	AS unique	AS unique	AS
<u>Number of Holes</u>	2	1	13	5	1	1	1	1
<u>Slope Position</u>	W	W	W	W	L	man made earth wall	man made earth wall	W
<u>Den Facing</u>	180°	292°	all directions	all directions	180°	360°	130°	NA
<u>Slope Angle</u>	0°	0°	0°	0°	50°	30°	30°	NA
<u>Elevation</u>	1200 ft 369 m	1200 ft 369 m	1200 ft 369 m	1200 ft 369 m	1160 ft 351 m	1080 ft 332 m	1100 ft 338 m	700 ft 215 m
<u>Vegetation Dominants</u>	Brru Scar Atpo	Brru Scar Atpo	Brru Scar Fesp Erse Hysa Gubr	Brru Scar Fesp Erse Hysa Gubr	(bare)	Brru Atpo	Brru Atpo	Brru Atpo
<u>Animal Signs</u>								
Fox Scats		+		+	+		+	
Fox Tracks								
Prey Remains		+		+				
Matted Vegetation	NA	NA	NA	NA				
Other Animals		RA				BO	BO	
Dirt Berms	+	NA	+	+			+	
<u>Human Activities</u>	DR	R	DR	DR OW	OW	R TS OW	TS R OW	NA



LAND UNIT 5. MIDWAY VALLEY (continued)

Den Code Number	27-3-1	27-3-2	27-3-3
Township Range	T32S, R23E — — — — —		
<u>Category</u>	IS	IM	IS
<u>Number of Holes</u>	1	2	1
<u>Slope Position</u>	U	U	W
<u>Den Facing</u>	230°	180°	90°
<u>Slope Angle</u>	15°	17°	0°
<u>Elevation</u>	1450 ft 446 m	1480 ft 455 m	1550 ft 476 m
<u>Vegetation Dominants</u>	Brru Atpo	Brru Atpo	Atpo
<u>Animal Signs</u>			
Fox Scats			
Fox Tracks			+
Prey Remains			
Matted Vegetation			
Other Animals			
Dirt Berms	+		
<u>Human Activities</u>	NA	NA	NA





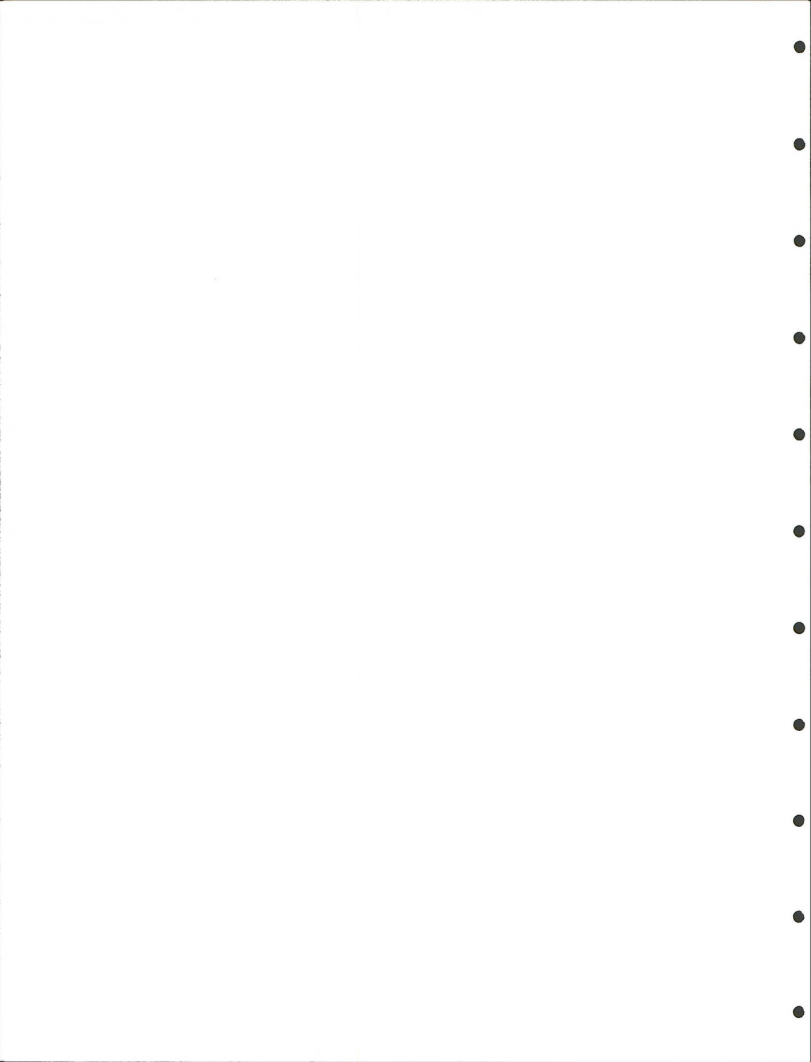
LAND UNIT 6. TEMBLOR FOOTHILLS

Den Code Number	18-2-1	28-1-1	28-1-2	28-1-6	28-1-7	28-1-9	28-2-1	28-2-4
Township Range	T31S, R22E — — — — — — — —							
<u>Category</u>	IM	AM	AS	AS	AM	AS	AM	AM
<u>Number of Holes</u>	15	8	1	1	3	1	4	2
<u>Slope Position</u>	M	M	U	L	L	NA	U	L
<u>Den Facing</u>	40°	0°	128°	240°	60°	346°	0°	270°
<u>Slope Angle</u>	30°	32°	NA	30°	34°	10°	20°	36°
<u>Elevation</u>	2200 ft 677 m	1800 ft 554 m	1800 ft 554 m	1950 ft 600 m	1950 ft 600 m	2050 ft 631 m	2050 ft 631 m	1900 ft 585 m
<u>Vegetation Dominants</u>	Isar Brru	Brru Atpo	Brru Atpo	Brru	Brru	Brru	Brru	Brru Fesp Atpo Gubr Isar
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains			+					
Matted Vegetation		NA	NA	NA	NA	NA	NA	NA
Other Animals	+	BO						
Dirt Berms	+		+	+	+	+	+	+
<u>Human Activities</u>		DR	DR	UD	UD	UD	UD	UD



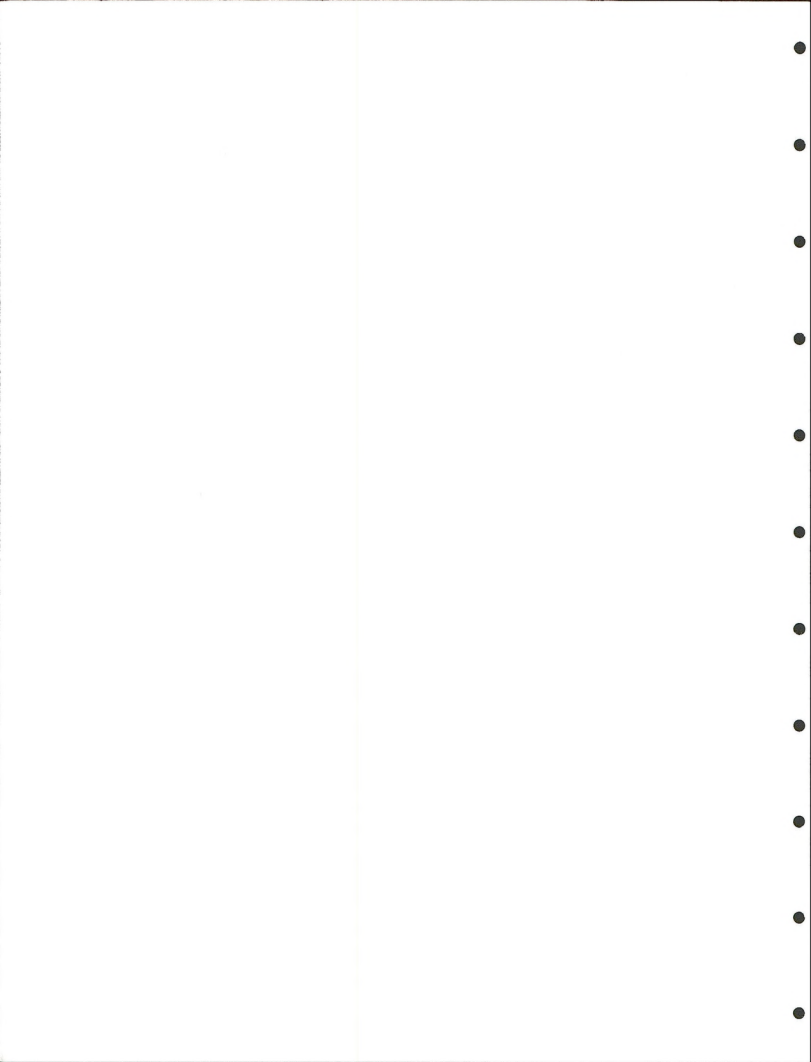
LAND UNIT 6. TEMBLOR FOOTHILLS (continued)

Den Code Number	33-1-1	33-1-2	33-1-3	33-1-4	33-2-1	33-2-2	33-3-1	33-3-2
Township Range	T31S, R22E							
<u>Category</u>	AM	IM	AS	AS	AS	AM	IM	AM
<u>Number of Holes</u>	2	2	1	1	1	2	3	2
<u>Slope Position</u>	W	C	U	U	U	U	L	U
<u>Den Facing</u>	180°	270°	180°	90°	35°	0°	110°	330°
<u>Slope Angle</u>	NA	20°	35°	35°	30°	35°	20°	35°
<u>Elevation</u>	2175 ft 669 m	2300 ft 708 m	2450 ft 754 m	2450 ft 754 m	2700 ft 831 m	2700 ft 831 m	2050 ft 615 m	2300 ft 707 m
<u>Vegetation Dominants</u>	EPCA Brru	Brru Eael	Brru	Brru	Brru	Brru	Brru	Brru EPCA
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation							+	+
Other Animals							BO, CY	
Dirt Berms			+	+	+	+	+	
<u>Human Activities</u>	NA	NA	NA	UD	NA	NA	UD	UD



LAND UNIT 6. TEMBLOR FOOTHILLS (continued)

Den Code Number	33-3-3	33-3-4	33-4-1	33-4-2	33-4-3	33-4-4	33-5-1	33-5-5
Township Range	T31S, R22E — — — — — — — —							
<u>Category</u>	AS	AS	AM	IS	AS	AS	AM	AS
<u>Number of Holes</u>	1	1	2	1	1	1	2	1
<u>Slope Position</u>	M	U	M	U	L	W	M	L
<u>Den Facing</u>	360°	270°	360°	50°	310°	360°	178°	320°
<u>Slope Angle</u>	50°	40°	30°	60°	25°	90°	24°	4°
<u>Elevation</u>	2250 ft 692 m	2750 ft 846 m	2500 ft 769 m	2500 ft 769 m	2000 ft 615 m	2000 ft 615 m	2000 ft 615 m	2100 ft 646 m
<u>Vegetation Dominants</u>	Brru Epca Hali	Brru Hali	Brru Haac Epca	Brru Epca Erfa	Brru Hali	Brru Atpo Eula	Brru	Brru Atpo
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation	+	+	+	+		+	NA	NA
Other Animals						CY		
Dirt Berms	+		+		+	+	+	+
<u>Human Activities</u>	UD	mine	mine	UD	UD	UD	UD	UD



LAND UNIT 6. TEMBLOR FOOTHILLS (continued)

Den Code Number	33-5-6	33-6-1	33-6-2	33-6-4	33-6-5	33-7-1	33-8-1	33-8-2
Township Range	T31S, R22E — — — — —							
<u>Category</u>	AS	AM	AM	AM	AM	AS	IS	AM
<u>Number of Holes</u>	1	2	3	3	2	1	1	2
<u>Slope Position</u>	U	M	M	M	M	U	M	U
<u>Den Facing</u>	58°	36°	332°	34°	80°	100°	160°	140°
<u>Slope Angle</u>	30°	22°	38°	16°	22°	10°	10°	20°
<u>Elevation</u>	2300 ft 708 m	2350 ft 723 m	2250 ft 692 m	2000 ft 615 m	1900 ft 585 m	1980 ft 609 m	1960 ft 603 m	1600 ft 492 m
<u>Vegetation Dominants</u>	Brru	Brru	Brru Epca Eael	Brru Atpo	Brru Isar	Brru	Brru Atpo	Brru Erfa
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation	NA	NA	NA	NA	NA			
Other Animals								
Dirt Berms	+	+	+	+	+	+		
<u>Human Activities</u>	UD	UD	UD	UD	UD	UD	UD	UD





LAND UNIT 6. TEMBLOR FOOTHILLS (continued)

Den Code Number	34-1-1	34-2-1	34-2-2	34-2-3	34-3-1	34-4-1	34-5-1	34-7-1
Township Range	T31S, R22E — — — — — — — —							
<u>Category</u>	AM	IS	IS	AM	AM	AS	AN	AS
<u>Number of Holes</u>	2	1	1	9	5	1	5	1
<u>Slope Position</u>	L	M	W	L	M	M	M	M
<u>Den Facing</u>	NA	NA	175°	NA	10°	190°	200°	14°
<u>Slope Angle</u>	NA	30°	NA	50°	50°	40°	38°	31°
<u>Elevation</u>	NA	NA	NA	NA	1900 ft 585 m	1900 ft 585 m	1900 ft 585 m	2000 ft 615 m
<u>Vegetation Dominants</u>	Brru	Brru	Brru	Brru	Brru Eael Fesp	Brru Fesp Scar Atpo	Brru Scar Atpo	Brru Atpo
<u>Animal Signs</u>								
Fox Scats					?		+	
Fox Tracks								
Prey Remains					+		+	
Matted Vegetation	+				+	+		+
Other Animals							BO	
Dirt Berms					+	+	+	
<u>Human Activities</u>	NA	NA	NA	NA	water tank	NA		UD



LAND UNIT 6. TEMBLOR FOOTHILLS (continued)

Den Code Number	34-8-1	35-1-1	35-2-1	7-6-1	18-2-1	18-1-1	20-1-1	20-2-1
Township Range	T31S, R22E — — —			T32S, R23E — — — — —				
<u>Category</u>	IM	IS	IS	AM	AM	IM	AN	AM
<u>Number of Holes</u>	6	1	1	5	2	+20	2	6
<u>Slope Position</u>	M	L	M	L	F	M	L	M
<u>Den Facing</u>	90°	300°	NA	0°	120°	90°	270°	0°
<u>Slope Angle</u>	NA	32°	27°	15°	5°	35°	NA	25°
<u>Elevation</u>	1770 ft 545 m	1600 ft 492 m	1635 ft 492 m	1500 ft 462 m	2150 ft 661 m	2200 ft 677 m	1700 ft 523 m	2075 ft 638 m
<u>Vegetation Dominants</u>	Brru Atpo	Brru Fesp Gubr Isar	Brru	Brru Atpo	Brru	Brru Fesp	Brru Gubr	Brru
<u>Animal Signs</u>								
Fox Scats					+		+	
Fox Tracks								
Prey Remains							+	
Matted Vegetation			+	+			+	
Other Animals		BO	BO		BO		GS	
Dirt Berms				NA	+		+	+
<u>Human Activities</u>	DR	UD	UD	R OW	HG	G	NA	UD



LAND UNIT 6. TEMBLOR FOOTHILLS (continued)

Den Code Number	20-3-1	20-4-1	20-4-2	20-4-3	20-4-4	20-5-1
Township Range	T32S, R23E — — — — —					
<u>Category</u>	IM	AS	AS	AS	AM unique	AS
<u>Number of Holes</u>	3	1	1	1	3	1
<u>Slope Position</u>	M	W	W	W	M	M
<u>Den Facing</u>	90°	180°	270°	180°	180° 360°	40°
<u>Slope Angle</u>	15°	90° bank	90° bank	90°	30°	18°
<u>Elevation</u>	1800 ft 554 m	2000 ft 615 m	1900 ft 585 m	1900 ft 585 m	1900 ft 585 m	2000 ft 615 m
<u>Vegetation Dominants</u>	Brru Eula	Brru Hysa	Brru Hysa	Brru Hysa	Brru Eael Isar Hysa	Brru Fesp Scar
<u>Animal Signs</u>						
Fox Scats						+
Fox Tracks						
Prey Remains						
Matted Vegetation					+	+
Other Animals						
Dirt Berms		+	+	+	+	+
<u>Human Activities</u>	NA	G	UD	UD	mine	OW R



LAND UNIT 7. BITTERWATER CREEK

Den Code Number	4-1-1	4-1-2	4-3-1	9,10-1-1	9,10-1-2	9,10-2-1	9,10-2-2	9-7-1
Township Range	T11N, R24W							
<u>Category</u>	AS	AS	AS	AS	AS	AS	AS	AN
<u>Number of Holes</u>	1	1	1	1	1	1	1	2
<u>Slope Position</u>	W	L	M	L	L	M	W	W
<u>Den Facing</u>	82°	244°	90°	70°	92°	90°	90°	300°
<u>Slope Angle</u>	16°	22°	12°	20°	26°	26°	24°	W
<u>Elevation</u>	1525 ft 469 m	1525 ft 469 m	1460 ft 449 m	1270 ft 290 m	1325 ft 408 m	1450 ft 446 m	1400 ft 431 m	1400 ft 385 m
<u>Vegetation Dominants</u>	Brru Scar Atpo	Brru Scar Atpo	Brru Atpo	Brru Atpo	Brru Atpo	Brru Atpo	Brru Atpo	Brru Atpo
<u>Animal Signs</u>								
Fox Scats	+			+	+			
Fox Tracks					+			
Prey Remains								
Matted Vegetation	+	+	+	+	+	NA	NA	
Other Animals				BO				
Dirt Berms	+	+	NA	+	+	+	+	
<u>Human Activities</u>	UD	UD	UD	DR	DR	UD	UD	NA





LAND UNIT 7. BITTERWATER CREEK (continued)

Den Code Number	10-5-1	10-6-1	10-6-2		15-3-1	32-3-1	32-4-1	32-5-1	32-5-2
Township Range	T11N, R24W — — — — —				T12N, R23W — — — — —				
<u>Category</u>	AN	AN	AN	AM	AS	IM	IM	AS	AS
<u>Number of Holes</u>	8	13	4	5	1	2	4	1	1
<u>Slope Position</u>	W	M	U knoll	M	W	M	L	F	F
<u>Den Facing</u>	110°	70°	50°	90°	340°	360°	90°	0°	0°
<u>Slope Angle</u>	30°	30°	20°	3°	W	50°	20°	0°	0°
<u>Elevation</u>	1200 ft 369 m	1300 ft 369 m	1300 ft 369 m	1275 ft 392 m	1175 ft 361 m	525 ft 162 m	525 ft 162 m	525 ft 162 m	525 ft 162 m
<u>Vegetation Dominants</u>	Brru Acar Atsp	Brru Atsp	Brru Atsp	Brru Atpo	Brru Atpo	Brru Saka	Brru Saka Atpo	Brru Atpo	Atpo
<u>Animal Signs</u>									
Fox Scats	+	+	+						+
Fox Tracks									
Prey Remains	+	+	+						
Matted Vegetation	+	+	+						
Other Animals	BO	BO				BO	BO, RA		+
Dirt Berms	+	+	+		+	+			
<u>Human Activities</u>	UD	UD	UD	UD		OW TS RD	OW TS RD		



LAND UNIT 8. CUYAMA VALLEY

Den Code Number	9-3-1	14-3-1	14-3-2		6-4-1	6-5-1	6-6-1	6-6-2
Township Range	T10N, R25W — — — — —				T10N, R26W — — — — —			
<u>Category</u>	AS	AS	AS	IS	AS	IS	IS	IM
<u>Number of Holes</u>	1	1	1	1	1	1	1	2
<u>Slope Position</u>	W	M	W	U	M	L	C	C
<u>Den Facing</u>	200°	150°	80°	300°	90°	23°	137°	137° 12°
<u>Slope Angle</u>	W	20°	W	22°	25°	70°	0°	1°
<u>Elevation</u>	2450 ft 754 m	2640 ft 812 m	2630 ft 810 m	2440 ft 751 m	2260 ft 695 m	2175 ft 669 m	2520 ft 775 m	2480 ft 763 m
<u>Vegetation Dominants</u>	Brru	Brru		Brru Atpo	Brru Epca	Brru Erfa Atpo	Brru	Brru
<u>Animal Signs</u>								
Fox Scats	+							
Fox Tracks								
Prey Remains								
Matted Vegetation								
Other Animals	BO	BO	+					
Dirt Berms		+	+	+	+			
<u>Human Activities</u>	UD	NA	NA	NA	UD	UD	UD	UD



LAND UNIT 8. CUYAMA VALLEY (continued)

Den Code Number	3-8-1	4-1-1	4-3-1
Township Range	T10N, R26W — — — —		
<u>Category</u>	AS	AM	AM
<u>Number of Holes</u>	1	2	3
<u>Slope Position</u>	L	U	L
<u>Den Facing</u>	90°	110°	225°
<u>Slope Angle</u>	15°	38°	4°
<u>Elevation</u>	2200 ft 677 m	2240 ft 684 m	2160 ft 665 m
<u>Vegetation Dominants</u>	Brru Atpo	Brru Atpo	Brru Atpo Scar
<u>Animal Signs</u>			
Fox Scats		+	+
Fox Tracks			
Prey Remains			
Matted Vegetation		NA	NA
Other Animals			
Dirt Berms	+		+
<u>Human Activities</u>	NA	UD	UD



## B-32

Den Code Number	34-1-1	34-4-1	10-1-1	10-4-1	10-4-2	10-4-3	10-5-1	10-6-1
Township Range	T21S, R17E	— — —	T22S, R17E	— — —	— — —	— — —	— — —	— — —
<u>Category</u>	AS	AS	IS	AN	AN	AN	AS	AN
<u>Number of Holes</u>	1	1	1	7	6	8	1	6
<u>Slope Position</u>	M	L	M	M	U	M	U	M
<u>Den Facing</u>	0°	315°	80°	225°	270°	225°	120°	355°
<u>Slope Angle</u>	35°	28°	25°	25°	22°	15°	20°	40°
<u>Elevation</u>	870 ft 268 m	800 ft 246 m	1120 ft 345 m	1080 ft 332 m	1080 ft 332 m	1080 ft 332 m	1100 ft 338 m	1080 ft 332 m
<u>Vegetation Dominants</u>	Brru	Brru Scar Atpo	Brru	Brru Scar Saka	Brru Scar Atpo	Brru some bare areas	Brru Saka	Brru Saka
<u>Animal Signs</u>								
Fox Scats				+	+	+		+
Fox Tracks							+	
Prey Remains				+	+			
Matted Vegetation		+		+	+	+		+
Other Animals							UR	BO
Dirt Berms	+	+		+	+	+	+	
<u>Human Activities</u>	UD	R OW	UD	G DR OEV	HG DR ORV	HG ORV	ORV G	ORV G





LAND UNIT 9. KETTLEMAN HILLS (continued)

Den Code Number	10-6-2	12-1-1	12-1-3	12-3-1	6-1-1	6-2-1	6-4-1	6-5-1
Township Range	T22S, R17E — — — —				T22S, R18E — — — —			
<u>Category</u>	AS	AM	AS	AS	AS	AS	AS	AM
<u>Number of Holes</u>	1	2	1	1	1	1	1	2
<u>Slope Position</u>	M	W	W	U	W	M	L	L
<u>Den Facing</u>	240°	360°	90°	180°	180°	0°	0°	40°
<u>Slope Angle</u>	30°	30°	90°	26°	36°	38°	35°	45°
<u>Elevation</u>	1050 ft 323 m	860 ft 265 m	860 ft 265 m	940 ft 289 m	600 ft 185 m	660 ft 203 m	675 ft 208 m	700 ft 215 m
<u>Vegetation Dominants</u>	Brru Saka	Brru Hysa Eael	Brru Atpo	Brru Scar Atpo	Brru Scar Atpo	Brru Scar	Brru	Brru Atpo
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation	+	+	+	+	+	+		+
Other Animals		CY	CY					CY
Dirt Berms		+		+	+	+		+
<u>Human Activities</u>	UD	R OW	R OW	R	R	R	UD	UD



LAND UNIT 9. KETTLEMAN HILLS (continued)

Den Code Number	6-6-1	6-8-1	6-8-2	8-2-1	8-6-1	8-7-1	8-7-2	8-8-1
Township Range	T22S, R18E — — — — — — — —							
<u>Category</u>	AM	IM	IM	AM	AM	AS	AS	AS
<u>Number of Holes</u>	4	2	2	4	4	1	1	1
<u>Slope Position</u>	L	L	L	W	L	U	U	M
<u>Den Facing</u>	225°	30°	80°	70°	210°	0°	0°	0°
<u>Slope Angle</u>	20°	28°	23°	0°	20°	16°	16°	28°
<u>Elevation</u>	800 ft 246 m	800 ft 244 m	900 ft 274 m	600 ft 185 m	700 ft 215 m	780 ft 240 m	780 ft 240 m	800 ft 246 m
<u>Vegetation Dominants</u>	Brru Atpo	stipa	Brru Atpo	Brru Atpo	Brru	Brru Scar	Brru Scar	Brru Atpo
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation	+					+	+	+
Other Animals				+				
Dirt Berms	+			+	+	+	+	+
<u>Human Activities</u>	R	UD	OW	UD	UD	UD	UD	R



LAND UNIT 9. KETTLEMAN HILLS (continued)

Den Code Number	18-1-1	18-1-2	18-1-3	18-3-1	18-3-2	18-3-3	18-3-4	18-4-1
Township Range	T22S, R18E — — — — — — — —							
<u>Category</u>	AS	IM	IS	AS	AS	AS	AM	IS
<u>Number of Holes</u>	1	8	1	1	1	1	6	1
<u>Slope Position</u>	U	L	M	U	M	M	U	C
<u>Den Facing</u>	92°	62°	47°	110°	290°	270°	20°	102°
<u>Slope Angle</u>	24°	28°	21°	10°	12°	28°	25°	4°
<u>Elevation</u>	1190 ft 363 m	1140 ft 347 m	1170 ft 357 m	1240 ft 381 m	1120 ft 345 m	1060 ft 326 m	1160 ft 357 m	1200 ft 369 m
<u>Vegetation Dominants</u>	Brru	Brru	Brru	Brru Atpo	Brru Atpo	Brru Atpo	Brru Atpo	Brru Fesp Atpo
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation				+	+	+	+	+
Other Animals							CY	
Dirt Berms				+	+	+	+	
<u>Human Activities</u>	UD	UD	OW	G R	R G	UD	R	R



LAND UNIT 9. KETTLEMAN HILLS (continued)

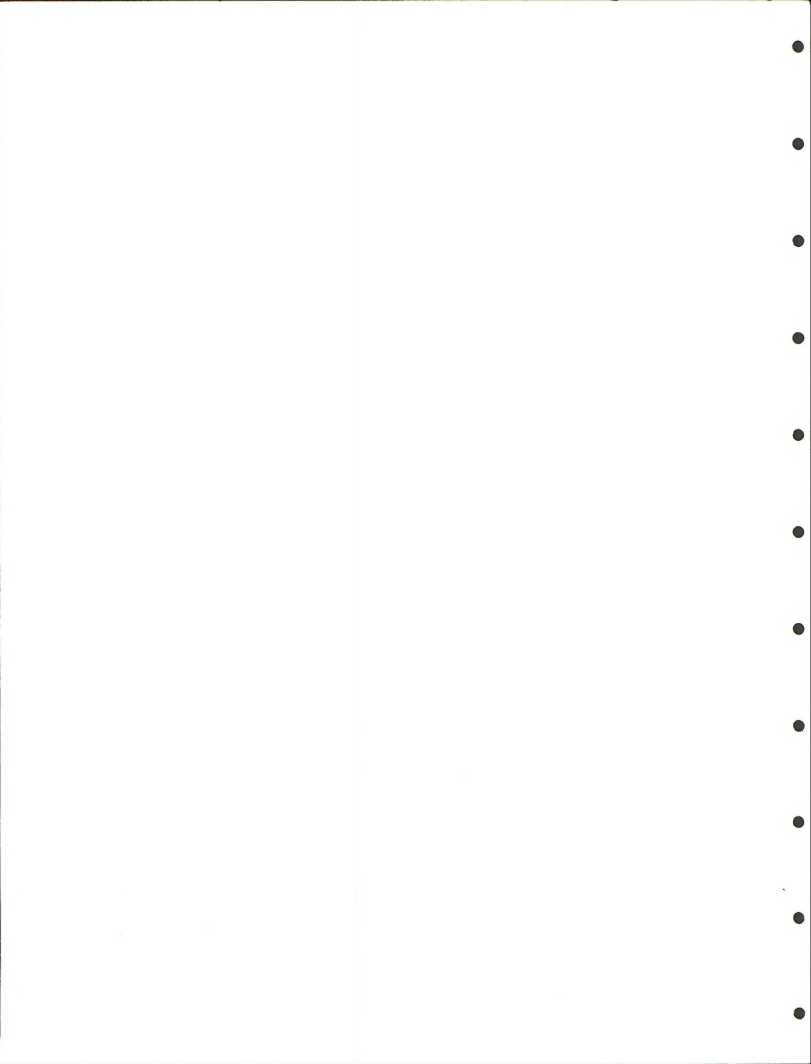
Den Code Number	18-5-1	18-5-2	20-1-1	20-1-2	20-2-1	20-3-1	20-3-2	20-4-1
Township Range	T22S, R18E	—	—	—	—	—	—	—
<u>Category</u>	AS	AS	IS	IS	AS	AS	AS	IM
<u>Number of Holes</u>	1	1	1	1	1	1	1	3
<u>Slope Position</u>	L	L	M	L	L	M	M	-C
<u>Den Facing</u>	320°	310°	110°	130°	106°	90°	0°	180°
<u>Slope Angle</u>	30°	20°	35°	25°	50°	15°	20°	5°
<u>Elevation</u>	970 ft 298 m	1100 ft 338 m	1250 ft 385 m	1175 ft 362 m	1025 ft 315 m	1050 ft 323 m	1025 ft 315 m	1050 ft 323 m
<u>Vegetation Dominants</u>	Brru Atpo	Brru	Brru Atpo	Brru Hysa	Brru	Brru Atpo	Brru	Brru Scar
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation								
Other Animals		+						
Dirt Berms	+	+			+	+		
<u>Human Activities</u>	UD	UD	UD	UD	UD	UD	UD	UD





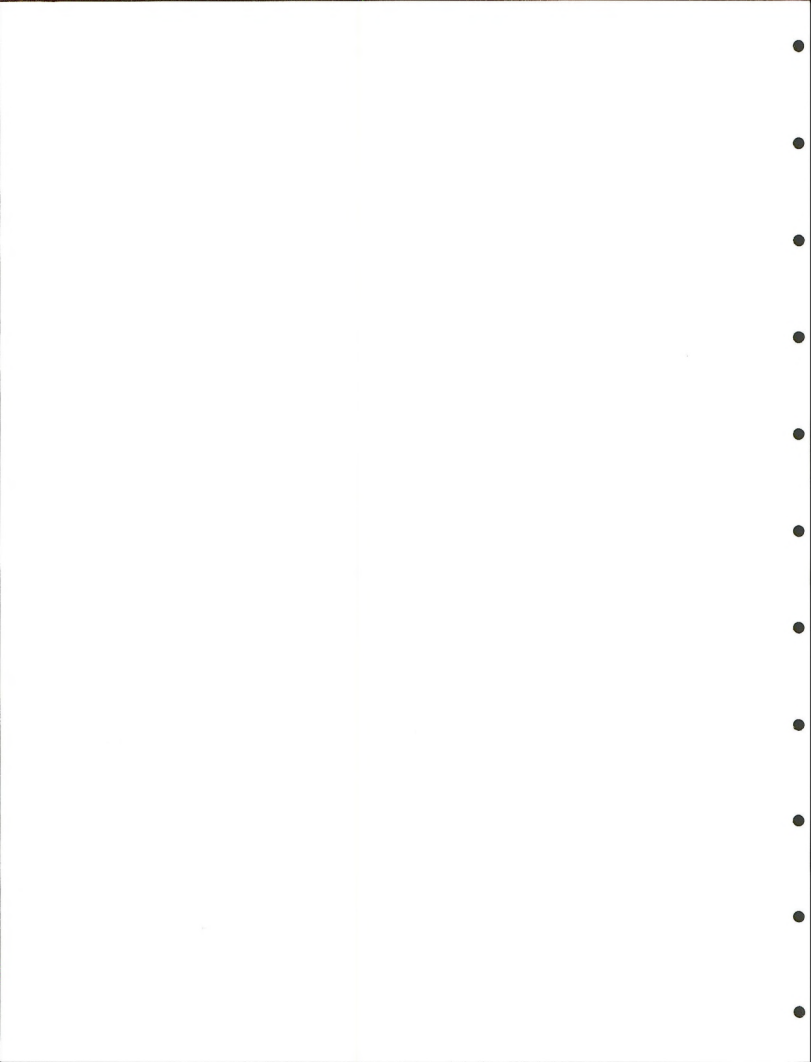
LAND UNIT 9. KETTLEMAN HILLS (continued)

Den Code Number	24-1-1	24-1-2	24-1-3	24-1-4	24-2-1	24-2-2	24-3-1	24-5-1
Township Range	T22S, R18E — — — — — — — —							
<u>Category</u>	IS	IS	IM	IS	IM	IS	AS	AM
<u>Number of Holes</u>	1	1	3	1	2	1	1	2
<u>Slope Position</u>	L	L	L	L	U	U	C	W
<u>Den Facing</u>	120°	47°	276°	256°	90°	294°	90°	270°
<u>Slope Angle</u>	42°	38°	27°	17°	30°	12°	35°	NA
<u>Elevation</u>	950 ft 290 m	1000 ft 305 m	1000 ft 305 m	1020 ft 311 m	980 ft 299 m	1000 ft 305 m	NA	900 ft 277 m
<u>Vegetation Dominants</u>	Brru Fesp Atpo	Brru	Brru	Brru	Brru Atpo	Brru	Brru	Brru Atpo
<u>Animal Signs</u>								
Fox Scats								
Fox Tracks								
Prey Remains								
Matted Vegetation								+
Other Animals								+
Dirt Berms								G
<u>Human Activities</u>	UD	UD	UD	UD	UD	UD		



LAND UNIT 9. KETTLEMAN HILLS (continued)

Den Code Number	24-6-1	24-6-2	28-2-1	28-5-1	28-5-2	28-5-3	28-6-1	28-6-2
Township Range	T22S, R18E — — — — — — — —							
<u>Category</u>	AS	AM	IM	IM	AM	AM	AS	AS
<u>Number of Holes</u>	1	3	4	7	4	5	1	1
<u>Slope Position</u>	L	M	U	U	L	M	L	- M
<u>Den Facing</u>	120°	150°	10°	90°	320°	320°	95°	260°
<u>Slope Angle</u>	6°	32°	12°	15°	35°	30°	40°	35°
<u>Elevation</u>	880 ft 271 m	920 ft 283 m	880 ft 268 m	1000 ft 308 m	920 ft 283 m	940 ft 289 m	1000 ft 308 m	950 ft 292 m
<u>Vegetation Dominants</u>	Brru Atpo	Brru Scar	Brru	Brru Fesp	Brru Atpo	Brru Atpo	Brru	Brru
<u>Animal Signs</u>								
Fox Scats				+		+		
Fox Tracks								
Prey Remains								
Matted Vegetation	+	+	+	+	+	+	+	+
Other Animals				CY	BO		BO	
Dirt Berms	+	+		+	+	+		+
<u>Human Activities</u>	UD	UD	UD	UD	UD	UD	UD	UD



LAND UNIT 9. KETTLEMAN HILLS (continued)

Den Code Number	28-7-1	28-8-1	30-2-1	30-4-1	30-4-2	30-5-1	30-6-1	30-6-2
Township Range	T22S, R18E — — — — — — — —							
<u>Category</u>	AM	AS	IS	AM	AM	AS	IM	AS
<u>Number of Holes</u>	5	1	1	12	3	1	11	1
<u>Slope Position</u>	L	M	U	L	U	W	W	U
<u>Den Facing</u>	225°	180°	53°	130°	90°	110°	90°	60°
<u>Slope Angle</u>	4°	10°	17°	30°	35°	32°	26°	28°
<u>Elevation</u>	980 ft 302 m	900 ft 277 m	920 ft 280 m	950 ft 292 m	925 ft 285 m	880 ft 271 m	900 ft 277 m	940 ft 289 m
<u>Vegetation Dominants</u>	Brru Scar Fesp	Brru Fesp Scar	Brru Fesp Saka	Brru Saka	Brru Atpo	Brru Scar	Brru Scar	Brru Scar
<u>Animal Signs</u>								
Fox Scats				+				
Fox Tracks								
Prey Remains								
Matted Vegetation	+	+		+		+	+	+
Other Animals			BO	BO, CY	BA			
Dirt Berms		+			+	+		
<u>Human Activities</u>	G DR	UD	G	G	G DR	G	G	G



LAND UNIT 9. KETTLEMAN HILLS (continued)

Den Code Number	30-7-1	30-7-2
Township Range	T22S, R18E	— — —
<u>Category</u>	AM	AS
<u>Number of Holes</u>	7	1
<u>Slope Position</u>	L	L
<u>Den Facing</u>	180°	150°
<u>Slope Angle</u>	25°	10°
<u>Elevation</u>	875 ft 269 m	870 ft 267 m
<u>Vegetation Dominants</u>	Brru	Brru
<u>Animal Signs</u>		
Fox Scats		
Fox Tracks		
Prey Remains		+
Matted Vegetation		
Other Animals	BO	BO
Dirt Berms		
<u>Human Activities</u>	UD	UD





LAND UNIT 10. FELLOWS

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Den Code Number            22-3-1

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Township Range

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Category                    IM

Number of Holes            2

Slope Position            L

Den Facing                180°

Slope Angle               NA

Elevation                1550 ft  
                              477 m

Vegetation Dominants    Brru  
                              Saka

Animal Signs

Fox Scats                    +

Fox Tracks

Prey Remains

Matted Vegetation

Other Animals               BO

Dirt Berms

Human Activities           OW  
                                  R

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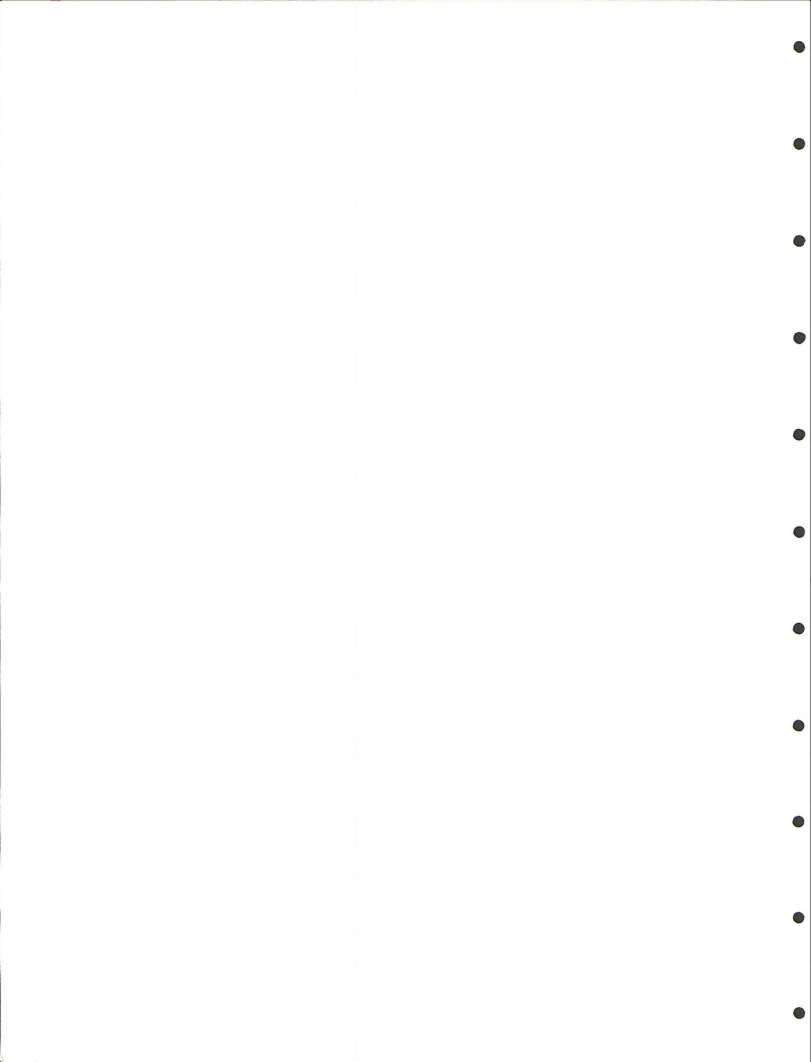


APPENDIX C: NUMBERS OF MAMMALS, REPTILES, AND BIRDS  
OBSERVED ON BLM LANDS BEING SURVEYED AS POTENTIAL  
CRITICAL HABITAT FOR SAN JOAQUIN KIT FOX IN 1979

Information is provided for individual land units, and a species total for the combined survey is also included.

Land unit code is as follows:

- 1 - Chico Martinez
- 2 - Frazer Valley
- 3 - Buena Vista Valley
- 4 - Telephone Hills
- 5 - Midway Valley
- 6 - Temblor Foothills
- 7 - Bitterwater Creek
- 8 - Cuyama Valley
- 9 - Kettleman Hills
- 10 - Fellows



Species	Land Units										Total
	1	2	3	4	5	6	7	8	9	10	
<u>MAMMALS</u>											
<i>Lepus californicus</i> Black-tailed jackrabbit	5	18	139	54	37	20	16	40	28	27	384
<i>Sylvilagus audubonii</i> Audubon's cottontail	1	1	42	30	63	19	6	16	13	33	224
<i>Ammospermophilus nelsoni</i> San Joaquin antelope ground squirrel	1	1	34	2	6	11	6		1	8	70
<i>Spermophilus beecheyi</i> California ground squirrel				5	1	5	2	4		3	20
<i>Canis latrans</i> Coyote	1	1				2	1	2	5		12
<i>Odocoileus hemionus</i> Mule deer								28			28
<u>REPTILES</u>											
<i>Uta stansburiana</i> Side-blotch lizard	13	2	33	4	3	40	28	28	14	22	187
<i>Crotaphytus silus</i> Blunt-nosed leopard lizard	1		3								4
<i>Cnemidophorus tigris</i> Whiptail lizard			8				1			2	11
<i>Phrynosoma coronatum</i> Coast horned lizard								1			1
<i>Crotalus viridis</i> Prairie rattlesnake							1	1			2
<i>Pituophis melanoleucus</i> Gopher snake								1			1





Species	Land Units										Total
	1	2	3	4	5	6	7	8	9	10	
<u>BIRDS</u>											
Turkey Vulture				2		1					3
Cooper's Hawk	1							4			5
Sharp-shinned Hawk								2			2
Marsh Hawk	10		3	1		10	1	5	5		35
Red-tailed Hawk	4	4	3	1	3	8	2	4	10	3	42
Golden Eagle		3				3	1				7
American Kestrel	3			1		3		4	9	1	21
Merlin						2		3			5
Prairie Falcon						1					1
California Quail			25	67	21	5	85	736	446	20	1405
Chukar						6		46			47
Long-billed Curlew									1		1
Killdeer					3					2	5
Mourning Dove	80	32	27	10	1	4	3	5	81	10	253
Roadrunner		6		2	1	1		9	2	7	28
Long-eared Owl	8										8
Burrowing Owl		3	4	2	5	4	9	3	4		34
Barn Owl		18	5			3	9		2		37
Common Flicker							1				1
Western Kingbird	1	2		1	2	2		6			14
Ash-throated Flycatcher	1		1				2	5			9
Say's Phoebe	10	2		2	1	6	8	12	11		52
Horned Lark	60		38	32	57	234	2	112	113	34	682



Species	Land Units										Total
	1	2	3	4	5	6	7	8	9	10	
<u>BIRDS</u> (continued)											
Barn Swallow			2		1						3
Violet-green Swallow								11			11
Raven	6	9	1	12	2	17	65	6	16	2	136
Rock Wren	10	1	25	12	1	10	4	46	11	8	128
Bewick's Wren		2									2
Mockingbird					1		1				2
Le Conte's Thrasher		1	10	4	5	5	5	3	1	4	38
Western Bluebird						2					2
Ruby-crowned Kinglet								1			1
Loggerhead Shrike	3	7	20	5	5	5	10	19	23	4	101
Starling										8	8
Western Meadowlark	67	63	10	11	11	45	36	51	91	2	387
Brewer's Blackbird								3		20	23
Lesser Goldfinch			23			22	5	19	3		72
Golden-crowned Sparrow	1		2								3
Sage Sparrow	28	22	39	11	51	12	58	135	10	1	367
White-crowned Sparrow	7	12	4	34	27	36	3	400	11		534
Song Sparrow			1		1			2	2		6
Fox Sparrow						1		28	1		30
Lark Sparrow	20	4	1			10		10			45
Savannah Sparrow							1				1
House Finch	5			20	7	78	18	43	69	2	242



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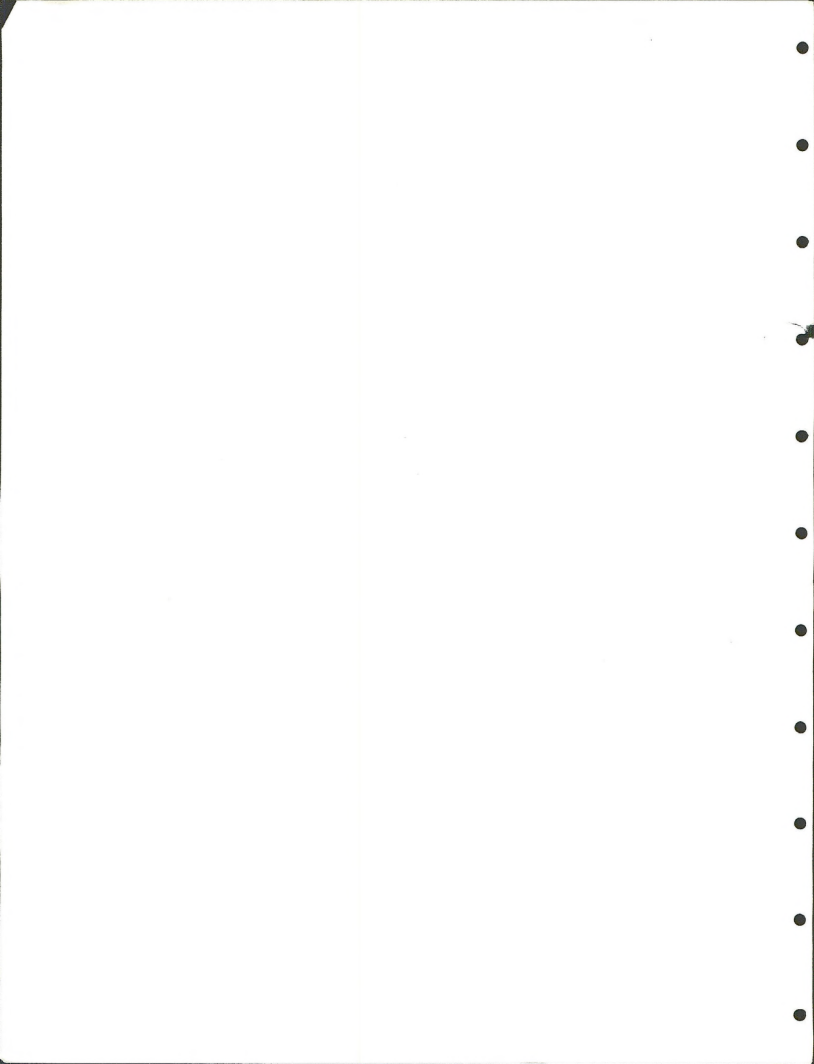
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